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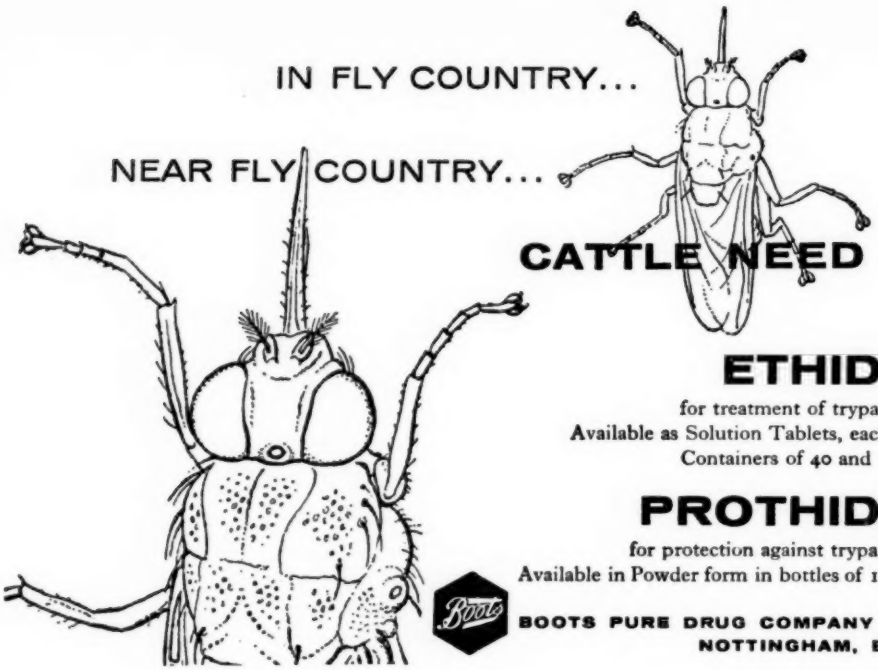

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The Future of Animal Husbandry in Overseas Territories

BY

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WITH increasing degrees of independence being achieved by overseas territories where livestock production has been largely or partly under the guidance of European officers, it is legitimate to speculate on the future. General standards of living in all territories have been rising during recent decades, and some have shown very remarkable progress. Unless some quite unforeseen cataclysmic disturbance arises, it is almost axiomatic to say that standards of living in all progressive countries can be expected to continue to rise in future, either slowly or rapidly, according to local circumstances. It is also axiomatic to say that there is a close correlation between consumption of meat and meat products and increasing levels of income *per capita* of the population, whether the income is from "natural" wealth, or from employment for wages in industry, agriculture, trading and commerce. As the income rises, the consumption of meat rises also.

Many of the African territories, those which have been under the British flag as well as those which have not, are essentially "meat deficiency" countries. The amounts produced locally together with what could be imported, usually from adjacent territories, have not for many years been able to satisfy local demands.

Much concern is being felt by responsible authorities throughout tropical and sub-tropical countries in Africa about the widespread and wholesale slaughtering of various species of wild game which have edible flesh. Apart from satisfying a traditional love of hunting, slaughtered game contribute towards satisfying a local meat deficiency. In some areas remarkable little waste occurs, everything edible including the skin and bones being consumed. In others there is much waste and inefficiency. In coastal areas, in the riverine belts of the great rivers, and near the big freshwater lakes, the fishing industry provides a further supply of animal protein which locally helps to satisfy demands for protein foods.

A suggestion has recently been made that it might lead to increased supplies of meat for human consumption if, instead of attempting to increase production of meat protein by improvements in the breeding and management of domesticated livestock, a deliberate policy of "game farming" was practised. This may well come as a shock to the orthodox mind, but the arguments in favour are worthy of consideration. It is pointed out that the edible game species including antelope, zebra, bushbuck, and other ungulates have largely established an equilibrium with their tropical environment and in areas least molested by man where food and water are plentiful can increase and multiply with astonishing rapidity. They possess great resistance if not absolute immunity to the vector-transmitted pathogenic blood plasmodia, and can successfully colonise "fly" areas where domesticated livestock cannot normally survive. They are able to obtain adequate nutrition and water supplies on account of their great mobility, independence and capacity to select the most favourable geographic localities in which to live. They only exceptionally suffer from the major virus diseases which, in the absence of prophylactic measures, are apt to ravage the cattle herds.

On the reverse side of the picture, the obvious disadvantages include the difficulty of controlling herds of wild game during growth and when slaughter is necessary; the great distances between the game-producing areas and the places where human population is most dense and where increased meat supplies are most required; and lack of adequate rapid transport facilities with refrigeration services, for the game meat in hot tropical territories. Further, game could not contribute to supplies of milk, butter, ghee, hides, manure, or inedible offal, in any way comparable with cattle.

There does seem, however, a need for further investigation of these suggestions, with perhaps a re-mapping of those areas where livestock improvement can be successfully intensified, and of the

sparsely populated areas where some degree of control might be exercised over wild game and from which a proportion of the game crop could be harvested annually for human consumption.

There is a further factor of increasing momentum. Indigenous populations are multiplying at speeds which are fast enough to give cause for alarm. In some areas the rate of human population increase is officially given as 2½ per cent. per year, which means that if maintained the population in these areas will have doubled in 40 years. Improved medical services, better hygiene and improved nutrition generally are major factors concerned. Knowledge of the techniques of, or indeed appreciation of, the need for artificial family limitation is meagre, and the traditional glory that comes from the possession of a large family is deeply ingrained in the tribesman.

The Education Factor

The widespread thirst for more and more educational facilities will take many years to satisfy and when the demands for higher and especially technical "livestock" education, already commencing, reach similar levels, some hope may be felt that supplies of indigenous milk and meat supplies will be increased.

The problems are many. In most tropical African territories, levels of milk production from available local breeds are low, while the rates of growth of cattle kept for beef production are extremely slow. It is not unusual for 4 to 5 years of feeding to be necessary before a beast reaches slaughter weight, while an average lactation yield of 300 gallons per cow is exceptionally high, many not reaching 200 gallons; and with a calf to feed, there is not much, if any, to spare for human use.

No excuse is needed for making these generalisations. There are of course many exceptions, but where exceptions occur they serve to throw the whole meat deficiency position into better perspective, and to indicate that great improvements can indeed be achieved, as indeed they have already been achieved, in many territories.

The problem to be faced in so many areas when the guidance of British trained officers of the Overseas Colonial Service comes to an end, seems to crystallise into the plain statement of "*more meat and milk more quickly.*" Obviously this is an oversimplification, though it is none the less true. The problems facing the new governments, which have still to obtain the wisdom which comes from experience, are many and complex.

There is no doubt that a sufficient amount of knowledge now exists to enable a good measure of control to be exercised over the great pandemic killing diseases of cattle: rinderpest, pleuropneumonia, and the various blood plasmodial diseases transmitted by arthropod vectors. Control of these diseases depends upon the efficient application of existing knowledge and proper organisation.

Work of the Veterinary Services

In every territory where these diseases were important the veterinary service has organised and introduced control measures which have been remarkably effective. It is unfortunate that due credit has not been given to those many members of these services who have each contributed to this achievement in Eastern, Western and Central African territories. A loss of 12 million cattle in central tropical Africa, such as that which occurred in 1894, is quite unthinkable under conditions as they exist to-day, but with any slackening of control measures, and especially with any failure of new territorial governments coming into power to maintain full veterinary services, history might well repeat itself and local or widespread meat famines might easily recur.

Control measures are being learnt rapidly by those professionally trained African officers who are succeeding to posts previously occupied by British Colonial Veterinary Service officers, and whose responsibility in future will increase.

Much more could be said regarding the prime importance of future livestock policies in African and other territories for which Great Britain has been hitherto responsible, during transition stages from colonial or mandated government to full independence. If there is no continuation of the organisations set-up to control disease, the future may be fraught with a constant menace to supplies of food of livestock origin, and chaos may follow.

It is submitted that veterinary surgeons, trained along modern lines, are in a unique position to make a further great and vital contribution to future welfare in these affected territories if given the opportunity.

The veterinary student to-day spends a minimum of 5 years training, concentrated entirely upon animal health and disease in all their aspects. There is no equivalent form of training for any other class of technical or professional officer. Agricultural students with normally either 3 or 4 years of academic training, must study a large range of disciplines other than those concerning animals. The time spent in studying soil chemistry, crop husbandry, marketing, farm economics, and so on, leaves time for only a superficial study of livestock production. No training is or can be given to them in the complicated problems of modern disease control in tropical territories. Agriculturalists cannot logically be expected to assume responsibilities for animal production, abattoir organisation and the processing of animal products for human consumption, under conditions where the great livestock plagues and a multitude of lesser ones are a constant menace.

It is only too well known that in the past, full use has seldom been made of the potentials of the veterinary staffs in many overseas territories, and time and again mistakes and failures have occurred because of the delegation of livestock development or improvement schemes to those with inadequate knowledge and training. Many of these schemes have been rescued from complete ruin at heavy ultimate cost to the taxpayer, and details have been hushed up or dealt with in a perfunctory manner.

It is certainly not too much to claim that such

(*Concluded at foot of page opposite*)

Toxoplasma in English Pigs

BY

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AND

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SUMMARY.—Toxoplasma has been isolated from pigs in Worcestershire. The principal signs of illness were dyspnoea and wasting in piglets. Lesions and organisms were seen in the lung, liver, kidneys and lymph nodes of piglets and Toxoplasma gondii *was recovered by mouse inoculation from the brain of the piglets' mother. Serum samples from apparently healthy pigs on the premises gave titres of from* 0 *to* 1:72 *in the Sabin-Feldman dye test.*

Introduction

SEVERAL authors have reported toxoplasma infection in pigs (Farrell, Docton, Chamberlain & Cole, 1952; Sanger & Cole, 1955; Momberg-Jorgensen, 1956; Sato, Saheki, Muto, Oishi, Kobayashi, Miyamoto & Ochi, 1958) and there have been many observations on antibodies to *Toxoplasma gondii* in pig sera (Weinman & Chandler, 1957; Roever-Bonnett, 1957; Rawal, 1959) but the condition has not hitherto been recognised in swine in Great Britain.

The purpose of this paper is to record an outbreak of toxoplasma infection in pigs in Worcestershire and to describe some features which may assist in the identification of further cases.

Materials and Methods

Tissues for histological examination were fixed in 10 per cent. neutral buffered formalin, embedded in paraffin, sectioned at 5 to 7 μ, and stained with Ehrlich's haematoxylin and eosin. Some sections were also stained with Giemsa, Shortt and Cooper's modification of Giemsa, Masson's trichrome, Gordon and Sweet's modification of Foot's method for reticulin, Grocott's modification of Gomori's silver methenamine method and a modification of Wright and Craighead's method.

Dye tests were performed by the method of Sabin and Feldman (1948) as modified by Beverley and Beattie (1952). Sera was inactivated at 60° C. for 30 minutes.

For mouse inoculation, several small ¼-inch cubes of tissue were taken from different parts of the organ until a 5-ml. sample was obtained from each tissue. These 5 ml. samples were ground up with 15 ml. of normal saline containing 100 units of penicillin and 10 μg. of streptomycin per ml. and then strained through 6 layers of gauze; finally all but the larger portions of tissue were squeezed through the gauze. After allowing 4 hours for the particulate matter to settle, 1 ml. of the fine deposit was inoculated into each mouse by the subcutaneous route.

Samples of serum from mice were obtained by bleeding from the tail. Mouse brains were examined for cysts by the method previously described by Beverley (1960).

History

On September 25th, 1959, a 2-week-old Large

The Future of Animal Husbandry in Overseas Territories.—*Concluded.*

utter fiascos as the Gambia Poultry Development Scheme or the Tanganyika Groundnuts Plan, to mention only two, now fading into the limbo of memories and past history, would never have failed if full veterinary considerations had been given the weight they deserved.

The main objective of these notes is to attempt to stimulate officers of Her Majesty's Overseas Veterinary Services, both past and present, to offer comments based upon their personal experience concerning future animal husbandry organisation. Full discussion is bound to be helpful. In these days of rapid change, preconceived and long held ideas and ideals may well themselves need change, and a more modern approach. Those who have had actual experience of the livestock problems under practical conditions in recent times are in the best position to contribute to a better understanding. The future is a challenge not only to the peoples themselves in the newly created countries, but to ourselves who have much to be proud of in the past.

Is it too much to hope that by full and constructive discussion the various new governments now coming into being may be made even more aware of the prime importance of proper organisation and development of their veterinary services?

This is not "special pleading," but an endeavour to do something, however small, to help towards success for those countries which are now assuming the great privileges and the heavy responsibilities of self-government.

White piglet which had died after a 2-day history of dyspnoea, was submitted to the Veterinary Investigation Centre at Worcester. The piglet came from a litter of 8, one of which had died earlier. Up to 20 sows had been kept on the premises in recent years and coughing had been a problem in pigs of various ages. The sire of the dead piglet had been purchased in June and developed a fluctuating pyrexia with yawning and dyspnoea during August. This boar had been slaughtered and had not revealed any gross lesions.

On October 30th another piglet from the same litter died after a wasting illness lasting over 2 weeks.

Necropsy findings in dead pigs. The first piglet to be examined (PD 4835) was a male weighing 4½ lb. There were slight abrasions of the skin over the knees and hocks. The submaxillary, prescapular, bronchial and mesenteric lymph nodes were markedly enlarged and contained pale tumour-like foci. The lumbar lymph nodes were blackened in a way similar to that following iron-dextran injection. The stomach contained only a little bile-stained mucus but the mucosa appeared normal. The liver, lungs, spleen, kidneys and myocardium contained many pale tumour-like foci about 2 mm. in diameter. Smears from these lesions stained by the Gram and Ziehl-Neelsen methods and routine cultural examination did not reveal any significant micro-organisms.

The second pig to be examined (PD 4865) was a female weighing 13 lb. There was a chronic abscess at the umbilicus, the carcase and visceral lymph nodes were enlarged, the lungs were extensively consolidated, there was marked excess of pericardial fluid and the kidneys appeared fibrotic.

Histopathology

From the first piglet (PD 4835) portions of lung, liver, kidney, spleen and lymph node were available for histological examination.

The *lung* showed alveolar and bronchial oedema. The alveolar walls were hyperaemic and thickened by fibrin and nongranular leucocytes, some of which had pyknotic or karyorrhectic nuclei. Many of the alveoli were rather loosely packed with mononuclear cells which included considerable numbers of very large macrophages with eccentric nuclei and copious eosinophilic vacuolated cytoplasm. The septa showed some evidence of fibroblast proliferation and were generally infiltrated with lymphocytes and plump histiocytes. Toxoplasms were very numerous, occurring mainly in the reticulo-endothelial cells and macrophages. The morphology of the organisms is described below.

In the *liver* small areas of necrosis were scattered through the parenchyma and some portal tracts were rendered prominent by the presence of fibrin, lymphocytes and necrotic cells. In the intralobular foci the reticulo-endothelial elements had survived better than the parenchymal cells and undergone some proliferation, but considering the degree of tissue destruction, inflammatory reaction was surprisingly slight (Fig. 1). Small numbers of organisms were visible in some of the lesions.

Most of the *lymph node* was occupied by extensive areas of necrosis, leaving a fine eosinophilic network dotted with pyknotic lymphocytes and reticulo-endothelial cells. Here and there small areas of undamaged lymphocytes survived. Small clusters of toxoplasms were visible in the necrotic areas.

In the cortex of the *kidney* there was a large area of reticulo-endothelial proliferation and lymphoid infiltration, with necrosis beginning to appear in its centre (Fig. 2). This process seemed to have been interstitial in its commencement, for glomeruli and scattered tubules survived in the lesion. The glomeruli did not show much evidence of damage, but the cytoplasm of the tubular epithelium was breaking up and a picture of slow dissolution was suggested. Terminal colonies were numerous.

From the second pig (PD 4865), lung, kidney and an inguinal lymph node were examined.

The *lung* showed local oedema and marked fibrous thickening in the pleura and septa with some extension of the fibrosis into the adjacent alveolar walls (Fig. 3). There was also considerable perivascular fibrosis (Fig. 4). Elongated groups of eosinophils, lymphocytes and plasma cells were scattered through the septa. The alveolar walls were thickened in a similar manner to PD 4835, and many of the alveoli contained oedema fluid and large, sometimes multinucleate macrophages with copious, eosinophilic, often foamy cytoplasm. In some areas there appeared to be some degree of peribronchial muscular hypertrophy, and many bronchi and bronchioles contained web-like masses of a tenacious-looking exudate. Toxoplasms were very numerous.

The presence of eosinophil infiltration and peribronchial muscular hypertrophy might be ascribed to parasitic bronchitis, but the absence of any significant degree of juxtabronchial lymphoid infiltration makes this unlikely.

The medullary tissue of the inguinal *lymph node* was very depleted of lymphocytes, leaving an eosinophilic reticulum containing widely separated reticulo-endothelial cells, some of which had a foamy cytoplasm (Fig. 5). A little basophilic debris was present, but cells in the process of necrosis were difficult to detect. Round the periphery of the node many of the histiocytes contained dark brown globules similar to those occasioned by the injection of iron-dextran compounds. Organisms were present in small numbers.

Many of the convoluted and collecting tubules of the *kidney* were widely dilated and contained amorphous, eosinophilic masses and a few necrotic epithelial cells. There was also at the surface of the cortex, a wedge-shaped area where the epithelium of the tubules was more basophilic than elsewhere and between these tubules was a mild degree of reticulo-endothelial proliferation and lymphoid and plasma cell infiltration. At the cortico-medullary junction there were a few small foci of lymphocytes and plasma cells and a small patch of fibrosis, and the medulla contained areas of hyperaemia and intertubular oedema. No unequivocal organisms could be detected in this kidney.

The morphology of the parasites (Figs. 6 and 7) was similar in all organs. The vast majority appeared round or oval, about 2 μ in diameter, with a central,

FIG. 1.—PD 4835. Liver. Focus of parenchymal necrosis with some reticulo-endothelial proliferation. H. & E. × 125 approximately.

FIG. 2.—PD 4835. Kidney. Area of granulomatous reaction isolating some tubules and glomeruli. The centre of the lesion lies to the left and the ill-defined periphery to the right. H. & E. × 125 approximately.

FIG. 3.—PD 4865. Lung showing marked septal fibrosis. Masson's trichrome × 50 approximately.

FIG. 4.—PD 4865. Lung. Perivascular fibrosis. H. & E. × 125 approximately.

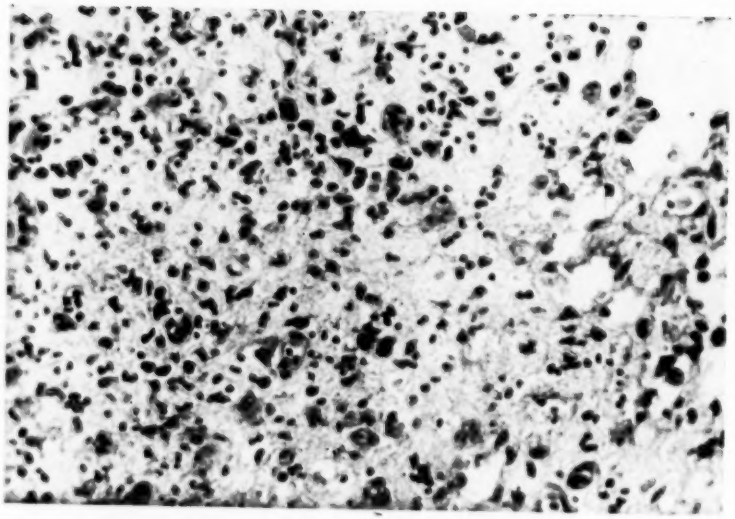

FIG. 5.—PD 4865. Inguinal lymph node. Most of the lymphocytes have vanished but an eosinophilic reticulum remains. H. & E. × 312 approximately.

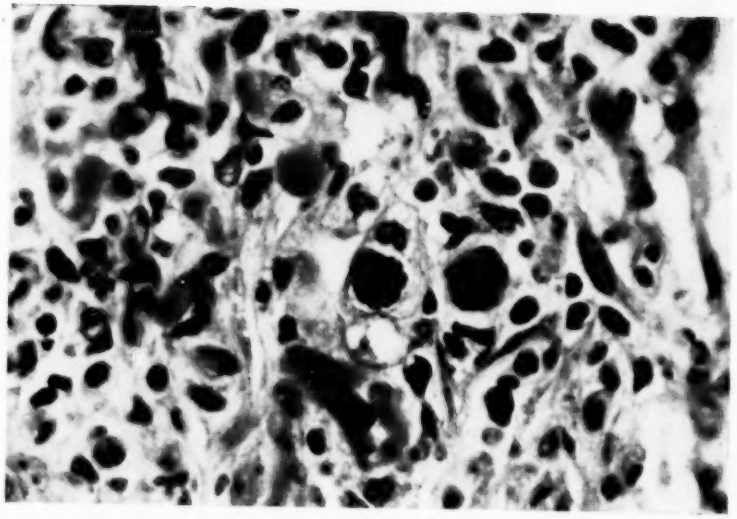

FIG. 6.—PD 4865. Lung. Large terminal colony in a histiocyte. At the top left is a smaller cluster of organisms in poor focus. H. & E. × 675 approximately.

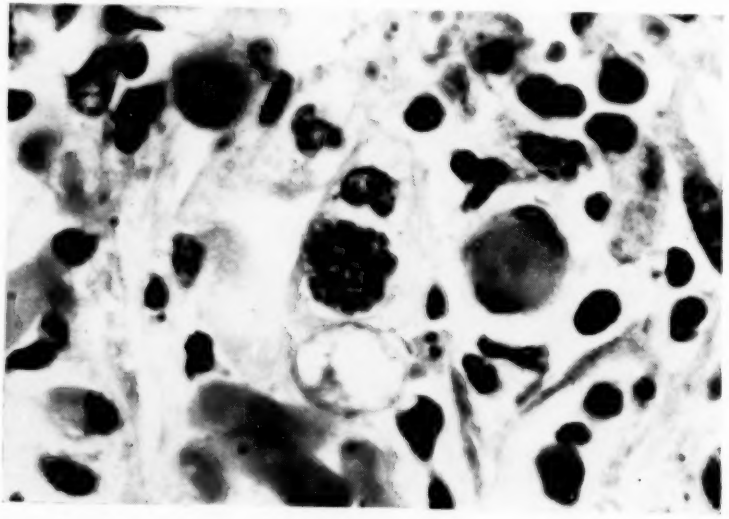

FIG. 7.—As Fig. 6. The larger colony at higher magnification. H. & E. × 1,087 approximately.

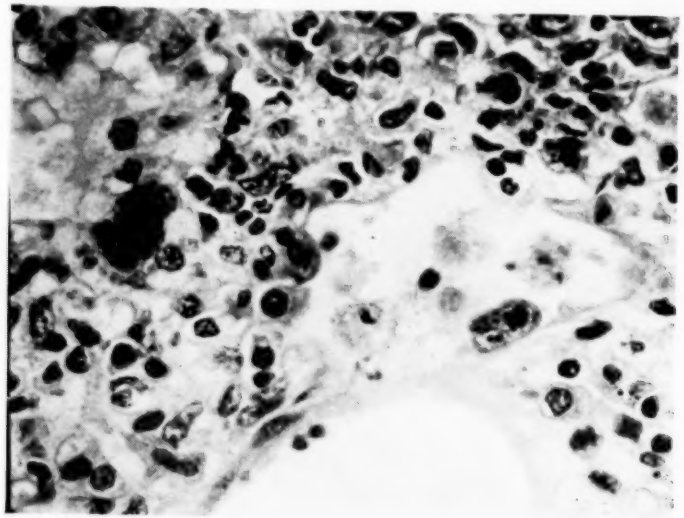

FIG. 8.—PD 4865. Lung. Two colonies of organisms, one of which protrudes sharply into the lumen of an alveolus. H. & E. × 600 approximately.

weakly basophilic mass. They occurred mainly in the cytoplasm of reticulo-endothelial cells and histiocytes in numbers varying from one to masses too numerous to count. Often these clusters were surrounded by a clear zone, but Gordon and Sweet's reticulin stain and Gomori's silver methenamine method did not reveal any argyrophilic "cyst wall." Organisms more difficult to observe were sometimes seen, apparently lying free in the tissues; these also were usually round or oval, but a few were seen to be pear-shaped, with the basophilic internal mass lying at the blunt end. No staining method was found superior to haematoxylin and eosin for the demonstration of the organism.

Further Investigation

On November 11th the premises were visited and blood samples were taken from the dam (No. 767) and litter mates (Nos. 413-415 and 891) of the dead piglets, from the sow in the next pen (No. 762), one of her litter (No. 887) and 4 other pigs on the premises (Nos. 408, 409, 419 and 901).

TABLE I

Number of pig	Date 12.11.59	10.12.59	17.12.59	Remarks
767	1 : 72		1 : 44	Dam of dead piglets
413	1 : 4			litter of sow 767
414	–ve			
415	–ve			
891	<1 : 4			
762	1 : 28			Sow in next pen
887	1 : 28	1 : 5		Offspring of sow 762
419	–ve			3 week old piglets; pneumonia at 2 weeks
901	1 : 16			
408	1 : 7			
409	1 : 5			

Sabin-Feldman dye test titres in clinically unaffected pigs from the premises.

It was reported at this time that 3 of a litter of 5 pigs in a pen near to the affected stock had been ill at 2 weeks of age with signs of pyrexia and pneumonia. One of the litter mates of the dead piglets had a septic castration wound but otherwise the animals appeared to be thriving.

On December 9th, pig 887, which came from the pen next to the affected litter and had shown the highest titre in the dye test, was slaughtered for detailed examination.

On December 17th sow 767, the dam of the affected litter, was slaughtered. On March 17th the owner reported that the survivors had done well and had been slaughtered in the normal course, without comment from the bacon factory.

Necropsy findings in the healthy pigs were scanty. The only lesion detected in sow 767 was an abscess in one supramammary lymph node.

Pig 887 had a small white spot about 1 mm. in diameter on the surface of the right kidney and a raised whitish protrusion about 2 mm. in diameter on the surface of the liver.

From pig 887 portions of the following organs were examined histologically: lungs, heart, kidneys, liver, spleen, lymph nodes, thyroid, adrenal, udder, turbinate bones, trachea, aorta, urinary bladder, uterus, alimentary canal, pancreas, brain, spinal cord and dorsal root ganglia. No organisms or definitely significant lesions were seen but there were traces of non-suppurative encephalitis in the anterior corpora quadrigemina.

From sow 767, brain, spinal cord, udder, uterus, diaphragmatic muscle and a 4-cm. foetus were examined histologically, but no significant abnormality was detected.

Protozoology

The results of Sabin-Feldman dye tests on sera taken at different times are recorded in the table.

None of the tissue submitted for animal inoculation showed any naked eye pathological changes. Material from sow 767 was inoculated into 11 mice; 4 mice received brain, 3 received diaphragmatic muscle, and 4 received a pooled emulsion of brain and liver from 2 foetuses.

The mice injected with diaphragm and with foetal tissues did not show any evidence of toxoplasmosis. Of the mice given the sow's brain, 1 died but was not fit for examination. The remaining 3 developed dye test titres of 1 : > 8,000, 1 : > 8,000 and 1 : 2,800. When killed 70 days after inoculation, examination of their brains revealed 960, 1,680 and 200 typical toxoplasma cysts.

Twelve mice were inoculated with material from pig 887. Six received brain, 2 tissue from around the pituitary fossa, and 4 a pooled emulsion of liver, spleen, lung, kidney and myocardium. Two of these mice developed low titres which subsequently became negative. When the mice were killed, no toxoplasma cysts were found.

Viscera from the 2 mice which gave transient titres were passaged into 6 new mice. Ten weeks later all 6 were serologically negative and no cysts could be detected in their brains.

Discussion

Few authors have mentioned the clinical signs of infection. Cole, Docton, Chamberlain, Sanger, Prior and Farrell (1953) observed shivering, weakness, coughing, inco-ordination, relaxation of abdominal muscles and diarrhoea. Sanger and Cole (1955) state that an experimentally infected gilt became listless and depressed and developed a mucopurulent nasal discharge. As in the cases described here, Momberg-Jorgensen (1956) records that dyspnoea was a prominent feature of the disease in 1-week-old piglets. Most authors have found lesions in the lungs when overt disease was present and it seems likely that pulmonary signs may be a common feature of acute toxoplasmosis in young pigs.

(*Concluded at foot of page overleaf*)

Ovine Abortion and Toxoplasmosis in Yorkshire

BY

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AND

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SUMMARY.—Toxoplasma *infection, as judged from a serological survey, has been found to be common in Yorkshire.*

Toxoplasma *antibodies were found in higher titres in ewes which had aborted from unknown causes than in those lambing normally and those aborting from known causes.*

Toxoplasma *was isolated from the brain or liver of* 6 *aborted or stillborn lambs from* 39 *ewes. These findings indicate that* Toxoplasma infection *may be a cause of abortion in sheep. They do not prove it.*

OVINE abortion, both in this country and abroad, has been attributed to a variety of infectious agents. As early as 1913, M'Fadyean and Stockman found that *Vibrio fetus* infection could result in abortion in ewes. This observation has since been confirmed and extended in the United States by Marsh (1924 , Ryff and Lee (1945), and Tucker and Robertstad (1956), and in Norway by Hoff and Kaldhal (1954) and Eide (1957). Members of the genus *Salmonella* have been isolated from aborted ovine foetuses ; *Salmonella abortus-ovis*, which is relatively host specific (Bosworth & Glover, 1925) has been most commonly isolated. In West Germany this infection is considered to be of primary importance as a cause of ovine abortion (Endrejaat, 1955). Another member of the *Salmonella* group less commonly associated with ovine abortion is *Salmonella dublin* (Shearer, 1957 ; Watson, 1959). *Brucella ovis* (Buddle & Boyes, 1953 ; Keogh *et al.*, 1959) has commonly been found in this connexion in New Zealand and Australia, and it has also been recorded in South Africa (Van Rensburg *et al.*, 1958) but not, as yet, in this country. Here, the only member of this genus isolated from ovine foetuses has been *Brucella abortus* (Young, 1953 ; Sinclair, 1955 ; Shannatyne, 1960).

Other bacterial infections associated with abortion in sheep are those ascribed to *Listeria* and *Leptospira* (Marsh, 1958), *Bacteroides fragilis* (Lindquist, 1956) and a *Corynebacterium* (Sprum, 1953).

Stamp *et al.* (1950) associated a large number of flock outbreaks of abortion in Scotland with infection by a virus of the psittacosis-lymphogranuloma group. This disease, generally termed " enzootic

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Toxoplasma in English Pigs.—*Concluded.*

In view of the marked fall in antibody titre which occurred over 4 weeks in the only piglet which was tested twice, it is probable that the antibodies present in the piglets were passively acquired and not necessarily indicative of infection.

The route of infection in these cases is not known. Farrell, Docton, Chamberlain and Cole (1952) noted that pigs brought into an infected herd became ill and Cole, Docton, Chamberlain, Sanger, Prior and Farrell (1953) isolated toxoplasma from colostrum and from piglets killed at birth, so it seems likely that both ante- and post-natal infection can occur. Fig. 8 illustrates a parasitised cell protruding into an alveolus which also contains exudate. It suggests that free toxoplasma or a cyst could easily be released into the air passages and so escape from the body and be a source of infection for other animals.

The microscopic lesions in the lung, particularly the septal and perivascular fibrosis and septal infiltration in the absence of juxtabronchial lymphoid infiltration, are distinctive and unusual and the authors have not seen similar lesions in any other disease of pigs.

These features may be useful in arousing suspicion of toxoplasma infection before the organism is recognised.

Acknowledgments.—The authors are indebted to Mr. C. Renfrew, M.R.C.V.S., of Broadway, for bringing these cases to their attention and for co-operation in the subsequent investigation.

References

BEVERLEY, J. K. A., & BEATTIE, C. P. (1952). *J. clin. Path.* **5.** 350.

———. (1960). " Recent Advances in Clinical Pathology." P. 46. Churchill, London.

COLE, C. R., DOCTON, F. L., CHAMBERLAIN, D. M., SANGER, V. L., PRIOR, J. A., & FARRELL, R. L. (1953). *Proc. XVth Int. vet. Congr., Stockholm, 1953.* Part 1. Vol. 1. P. 401.

FARRELL, R. L., DOCTON, F. L., CHAMBERLAIN, D. M., & COLE, C. R. (1952). *Am. J. Vet. Res.* **13.** 181.

MOMBERG-JORGENSON, H. C. (1956). *Nord. VetMed.* **8.** 227.

RAWAL, B. D. (1959). *Lancet.* April 25th. 881.

ROEVER-BONNETT, H. DE (1957). *Docum. Med. geogr. trop. (Amst.).* **9.** 17 & 336.

SABIN, A. B., & FELDMAN, H. A. (1948). *Science.* **108.** 660.

SANGER, V. L., & COLE, C. R. (1955). *Am. J. Vet. Res.* **16.** 536.

SATO, H., SAHEKI, Y., MUTO, T., OISHI, I., KOBAYASHI, S., MIYAMOTO, Y., & OCHI, Y. (1958). *Jap. J. Vet. Sc.* **20.** 213.

WEINMAN, D., & CHANDLER, A. H. (1956). *J.A.M.A.* **161.** 229.

abortion," is now widely recognised in this country. It has been recorded in Germany (Mitscherlich, 1954), France (Giraud, 1956), Hungary (Hadju *et al.*, 1958) and in the United States (Young *et al.*, 1958).

Ovine abortion or stillbirth in Yorkshire has been shown to occur in more than 3 per cent. of all breeding ewes (Sellers & Leech, 1955 ; Leech & Sellers, 1959).

During 1957 and 1958 products of abortion and ovine sera from Yorkshire flocks were examined by one of us (W.A.W.) for evidence of bacterial or viral infection. The results are shown in Table I

TABLE I
RESULTS OF INVESTIGATIONS IN FLOCK ABORTION, OUTBREAKS IN YORKSHIRE DURING 1957 AND 1958

	1957	1958
Flocks examined	39	34
Flock infection by *Vibrio fetus* ...	11 (28·2%)	12 (35·3%)
Flock infection by enzootic abortion	8 (20·5%)	8 (23·5%)
No pathogen found...	20 (51·3%)	14 (41·2%)

and indicate that a large number of flock abortion outbreaks are the result of some, as yet unrecognised, aetiological factor or factors. During the autumn of 1958 *Toxoplasma gondii* was considered as a possible cause of these abortions.

Toxoplasma gondii, a protozoan parasite, was first isolated from a North African rodent, the gondi, by Nicolle and Manceaux in 1908 and since that date, most species of warm-blooded animals, including man, have been found to harbour the organism. Several instances of ovine infection by this parasite are known. Nervous signs were present in a single ewe in which *Toxoplasma* pseudocysts were found (Wickham & Carne, 1950) and respiratory and nervous symptoms have been seen in association with a flock infection (Cole, 1954). This author isolated *Toxoplasma* from the animals, was successful in reproducing the disease in clinically healthy sheep, and recovered the organism from the aborted foetuses and stillborn lambs. Hartley and his colleagues (1955 and 1957) described a disease affecting the foetal membranes from aborting ewes. *Toxoplasma* was isolated and the condition was transmitted to other ewes by inoculation of either a suspension of diseased cotyledons or the isolated *Toxoplasma*.

Several surveys of *Toxoplasma* serum antibodies (dye test antibodies) have been made in healthy sheep. Sabin and Feldman (1948), the originators of the dye test, state that many species, including sheep, have non-specific thermolabile *Toxoplasma* antibodies and that all animal sera should be inactivated before testing for specific antibodies. Fe dman and Miller (1956) recorded the intriguing finding that whereas 56 per cent. of Kentucky sheep had antibodies to a titre of 1 : 16, only 5 per cent. of Navaho sheep had such levels. They, of course, tested these sera after inactivation. Cathie (1957) found 54 of 69 (77 per cent.) sheep to have a thermolabile antibody up to titre of 1 : 16, but none had any thermostabile antibody. The source of these sheep was not given but it is likely that they were from the South of England. Garnham and Lainson (1960), when searching for 6 non-immune lambs found them in the first 6 to be tested ; these were from the South of England. Roever-Bonnet (1958), testing uninactivated sera, found 19 of 22 (86 per cent.) sheep in Amsterdam to be positive, 14 (63 per cent.) to a titre of 1 : 16 or more. She also isolated *Toxoplasma* from 4 of 30 sheep brains selected at random at a public abattoir. Rawal (1959) confirmed that sheep do have thermolabile antibodies and in a preliminary survey found that sera of 11 of 100 sheep after inactivation, slaughtered in the Sheffield abattoir, were positive, 7 to a titre of 1 : 16 or more. Of a further 100 Sheffield sheep 21 were positive, 12 to a titre of 1 : 16 or more and from the brains of these 21, 6 strains of *Toxoplasma* were isolated, 1 from a sheep whose titre was only 1 : 4. Unfortunately, the areas from which these animals had come could not be ascertained. He also found 4 of 100 Bombay sheep were positive, 2 at titres of 1 : 16 or more.

In the spring of 1959 all farmers who had submitted aborted foetuses to the Leeds Veterinary Investigation Centre during the preceding 4 years were asked to send for examination all aborted ovine foetuses and, if possible, the placenta. Full details of the flock history were obtained in as many cases as possible at a later date.

Laboratory and Field Investigations

Laboratory Examinations

In each instance the stomach contents of the foetuses were examined microscopically and cultured on tryptose blood agar in 10 per cent. CO_2 at 37° C. for 6 days ; the placentas were examined microscopically for inclusion bodies of enzootic abortion. The ewes' sera were also examined for complement fixing antibodies of enzootic abortion.

Additional examinations introduced for the detection of *Toxoplasma* infection included attempts at isolation from the aborted material and quantitative serum antibody tests on the ewes. The aborted foetuses were collected by the farmers and posted in separate containers to Leeds. From those foetuses in a reasonable state of preservation, a portion of liver weighing approximately 4 oz. was removed aseptically, placed in a sterile container and, along with the whole unopened head, was re-posted to Sheffield for *Toxoplasma* investigation. The time between the abortion occurring and the receipt of specimens in Sheffield varied from 48 to 120 hours. As, almost invariably, there were no naked eye lesions in either liver or brain, in order to obtain representative samples several small, widely scattered portions of tissue in the form of ¼-inch cubes, were taken to form a 5 ml. sample from each organ. These 5 ml. samples were finely ground with a pestle and mortar with the gradual addition of 15 ml. of saline containing 100 units of penicillin and 10 μg. of streptomycin per ml. The suspension was strained through 6 layers of gauze and finally all but the largest unground portions of tissue squeezed through the meshes. The strained suspension was allowed to stand for 2 to 3 hours and the deposit was then inoculated subcutaneously into mice. 1·0 ml. of brain suspension was given to each of 4 mice and 1·0 ml. of liver to of each 2 mice.

Only a few mice died (from intercurrent infection) in the observation period of 8 weeks. The survivors were then killed and their brains removed and emulsified separately in 1·0 ml. of saline. One drop of this emulsion, with 2 drops of saline, was examined on a slide under a $\frac{7}{8}$-inch square coverslip using the low power of the microscope. In those cases where cysts were found they were easily recognisable and had a diameter of 20 to 50μ. When present, between 3 and 50 cysts were seen in each film. Their nature was confirmed by examination under high power and oil immersion lenses, and by passage into clean mice to demonstrate their viability and their antigenic relationship with known strains of *Toxoplasma*. By reason of limited accommodation for experimental animals we were only able to examine 44 aborted or stillborn lambs from 39 ewes. These 44, of which 5 cases were twins, were selected at random from a total of 224 foetuses. In 7 of the cases where no cysts were seen, a second passage of clean mice was made but no further instances of infection were detected by this means.

Field Investigations

During November and December, 1958, blood samples were taken from 164 sheep in 7 flocks in Yorkshire and tested for *Toxoplasma* antibodies. Three of these were typical East Riding wold flocks in which the ewes were folded on roots during winter and before lambing. Two were West Riding hill flocks and 2 were on lower land in the West Riding. From February 1st, 1959, in all three Ridings nearly 93 flocks, from which aborted material was sent to the laboratory, were visited. Blood samples were taken from ewes which had aborted and from those which had lambed normally. Samples were also taken, as opportunity arose, from other flocks which had no abortion problem. These visits were made between the 1st and 11th weeks after the onset of abortions, most of them 2 to 3 weeks after lambing was completed. In all, 175 samples were obtained and examined from normal ewes, 158 from ewes aborting from a previously unknown cause, and 51 from ewes with a known cause of their abortion. All sera were separated from the clot on the same day that the samples had been taken and sent by post to Sheffield. They were then stored at –20° C. until tested. Quantitative testing for *Toxoplasma* cytoplasma modifying antibodies was performed by Beverley and Beattie's (1952) modification of Sabin and Feldman's (1948) method. All sera were inactivated at 60° C. for 20 minutes just prior to testing.

Results

Examination of materials from 93 flocks for known infectious causes of abortion yielded evidence of the presence of the virus of enzootic abortion in 29 (either by microscopy or by serological tests or by both methods), of *Vibrio fetus* in 4 and of *Salmonella dublin* in 1; from 1 abortion *Corynebacterium pyogenes* was isolated. In none of the flocks was there evidence of brucellosis. No known pathogen was detected in the remaining 59 flocks.

Six isolations of *Toxoplasma* were made from the products of conception of 39 ewes—5 times from brain, once from liver and on no occasion from both tissues. All the strains have, so far, been of similar form and behaviour to the low virulence Rabbit A strain described by Beverley (1959). In none of these 6 cases was there any evidence of either *Vibrio fetus* or enzootic abortion infection. On the other hand, evidence of one or other of these pathogens was found in 9 of the other 33 ewes or their products of conception from which *Toxoplasma* was not isolated.

The available information on the animals from which *Toxoplasma* was isolated is summarised in Table II. These 6 ewes came from 5 separate premises and the flock histories are as follows :

Flock A

This was an East Riding wold flock which had experienced vibrionic abortion during 1958. In 1959 virus abortion was diagnosed in certain animals in the flock but not in the particular ewe from which *Toxoplasma* was isolated. Six abortions occurred and 8 ewes had one or more stillborn lambs out of a total of 113 lambing ewes.

TABLE II
DETAILS OF FOETUSES AND FLOCKS FROM WHICH TOXOPLASMA WAS ISOLATED

Animal	Flock	Breed	Foetus		Ewe		Result C.F.T.E.A.E.
			Type and age of foetus	Lesions at autopsy	Breeding history 1958	Blood titre to dye test	
1	A.	Leicester X	Single 110 days	Necrotic liver foci	Full term dead twins	1/150 15 days after abortion	Negative
2	B.	Dalesbred	Single 125 days	Lung oedema	Full term live twins	1/74 37 days after abortion	Negative
3	C	Suffolk X	Twin to mummified foetus 130 days	None	Not known	Not sampled	
4	D	Leicester	Single full term	None	Not known	1/68 1 day after abortion	Negative
5	D	Suffolk X	Twin to live normal lamb. Full term	None	Not known	1/26 1 day after abortion	Negative
6	E.	Suffolk X	Single 130 days	None	First lambed in 1959	Not sampled	

Key : C.F.T.E.A.E. : Complement Fixation Test for Enzootic Abortion of Ewes.

Flock B

A West Riding hill flock with no previous history of abortion. Only 1 abortion occurred during 1959 and from this foetus *Toxoplasma* was isolated.

Flock C

An East Riding grassland flock with no previous abortion problem. During 1959 8 abortions occurred and 4 ewes had one or more lambs born dead at full term, out of a total of 86 breeding ewes. No satisfactory explanation for these abortions was found. Two pairs of twins and one single and the placenta in each instance were examined. Only the single lamb, however, was examined specifically for *Toxoplasma*, and the organism was isolated from this foetus.

Flock D

An East Riding wold flock with a history of abortion for several years. Virus abortion had been confirmed previously and the flock carried out a policy of vaccination. Abortion was not a problem during 1959. Two isolations were made from this flock, in both instances from stillborn lambs.

Flock E

A West Riding grassland flock, with no previous history of an abortion problem. During 1959 12 ewes aborted and 12 had one or more full term dead lambs, out of a total of 326 ewes. No evidence of bacterial or viral infection was found in the 2 foetuses and 2 placentas sent for examination. The organism was isolated from the only foetus examined specifically for *Toxoplasma*.

The results of the serum antibody tests are presented in Table III and for simplicity they have been grouped as weak or negative (<1 : 16), moderate positive (1 : 16 to 1 : 64) and strong positive (1 : 128 to 1 : 1,024). There is no significant difference between the antibody levels of those ewes which lambed normally in the spring, those bled in the autumn ($\chi^2 = 1{\cdot}73$ d.f. $= 2$. $P = 0{\cdot}4$) or those which aborted in the spring from a bacterial or viral cause ($\chi^2 = 0{\cdot}63$ d.f. $= 2$. $P = 0{\cdot}7$) but there is a significant difference from those which aborted in the spring from other causes ($\chi^2 = 14{\cdot}7$ d.f. $= 2$. $P = 0{\cdot}001$).

Discussion

The management of flocks in Yorkshire can roughly be divided into 3 main types which are (*a*) the wold type in the East Riding, (*b*) the hill type in the North and West Ridings, and (*c*) the lowland type of grassland flock which is found throughout the centre of the county from North to South and mainly in the North and West Ridings. It has been found (Sellars & Leech, 1955) that abortion affects more than twice as many ewes on the wolds as elsewhere in the county. This higher incidence could, in part, be because the system of close folding, which is practised in this area, predisposes to the spread of infectious forms of abortion.

A comparison of the dye test results of ewes in the wolds with those of the rest of the county was, therefore, made and the results are presented in Table IV.

It will be seen that there is no substantial difference between the antibody levels of those sheep which lambed normally in any of the 3 areas ($\chi^2 = 1{\cdot}71$ d.f. $= 4$. $P = 0{\cdot}8$) and that there is no difference between the normal and the aborted ewes in the hill flocks but there is in the wold and the grassland flocks. It is more marked in the former ($\chi^2 = 12{\cdot}0$ d.f. $= 2$. $P = 0{\cdot}0025$) than in the latter ($\chi^2 = 8{\cdot}36$ d.f. $= 2$. $P = 0{\cdot}02$), but the levels of the differences in each suggest that *Toxoplasma* infection is in some way connected with ovine abortion in both the areas where these flocks are found.

Here it should be noted that of the 6 *Toxoplasma* isolations, three were made from wold cases (out of 15 examined), two from grassland cases (out of 13 examined) and one from a hill case (out of 11 examined). Whether or not the organism was the cause of the death of the foetus in these cases is not definitely known, although other authors (Cole, 1954 ; Hartley & Marshall, 1957) have demonstrated the pathogenicity of *Toxoplasma* in the

TABLE III
TOXOPLASMA "DYE-TEST" TITRES OF NORMAL AND ABORTING EWES

	Negative – 1 : 8	1 : 16 – 1 : 64	1 : 128 – 1 : 1·024	Total
Autumn sample	66 (40 per cent.)	89 (55 per cent.)	9 (5 per cent.)	164
Lambed normally	59 (34 „)	108 (61 „)	9 (5 „)	176
Aborted due to a viral or bacterial cause	14 (28 „)	34 (66 „)	3 (6 „)	51
Aborted due to other causes	29 (18 „)	107 (68 „)	22 (14 „)	158

TABLE IV
RESULTS OF THE DYE TEST FOR TOXOPLASMA ANTIBODIES

Type of flock	Type of ewe	Negative – 1 : 8	1 : 16 – 1 : 64	1 : 128 – 1 : 1·024
Wold flocks	Lambed normally	23 (29 per cent.)	52 (66 per cent.)	4 (5 per cent.)
	Aborted unknown cause	6 (10 „)	46 (74 „)	10 (16 „)
Grassland flocks	Lambed normally	27 (38 „)	41 (58 „)	3 (4 „)
	Aborted unknown cause	13 (20 „)	43 (65 „)	10 (15 „)
Hill flocks	Lambed normally	9 (34 „)	15 (58 „)	2 (8 „)
	Aborted unknown cause	10 (33 „)	18 (60 „)	2 (7 „)

pregnant ewe. It is, however, suggestive that the organism was isolated in these 6 instances from foetuses born of ewes in which no evidence was obtained of the presence of any infection known to produce foetal death. The dye tests results of 4 of these animals were 1 : 150, 1 : 74, 1 : 68 and 1 : 26. The other 2 could not be traced.

In their cases, Hartley and Marshall (1957) found mummification or varying degrees of intra-uterine decomposition, mild to marked subcutaneous oedema which was sometimes clear and sometimes blood-stained, and varying degrees of bloodstained fluid in the body cavities with or without flakes or strands of fibrin. These changes were seen but not confined to those foetuses with *Toxoplasma* infections, as they were present in many of the other aborted foetuses. Multiple small necrotic foci were found throughout the liver in one case, and a marked degree of pulmonary oedema in another. Ovine foetal liver necrosis of this type has been previously associated only with *Salmonella* and *Vibrio* infections, but Ratcliffe and Worth (1951) found necrotic liver lesions and pronounced lung oedema in both mammals and penguins at the Philadelphia Zoo from which *Toxoplasma* were isolated, and Christiansen and Siim (1951) found focal hepatic necrosis to be common in an epizootic of toxoplasmosis in hares. Hepato-splenomegaly, with or without jaundice, is a common finding in human congenital *Toxoplasma* infections.

It is unlikely that sheep in all areas will be similarly affected by *Toxoplasma*. Feldman and Miller (1956) have shown that the incidence of infection varies in difference parts of the United States ; while in this country Cathie (1957) and Garnham and Lainson (1960) each found a very low incidence and Rawal (1959) an incidence of between 11 and 21 per cent. We, in Yorkshire, have found 89·5 per cent. of normal lambing ewes positive, 66 per cent. to a titre of 1 : 16 or more. Not one of the aborting sheep in the wold flocks was negative. It is of interest that in a group of 9 Dorset Horn ewes recently purchased from the south of England, 1 had a titre of 1 : 64, 4 1 : 8 or less and 4 were negative. Of further interest is the possible correlation between Feldman and Miller's (1956) finding that only 5 per cent. of Navaho sheep were positive as against 56 per cent. of the Kentucky sheep, and our finding that the infection rate in hill sheep, as judged by blood test results, appeared to be lower than in grassland and wold flocks. Navaho sheep are reared in the arid barren mountain desert country on the borders of New Mexico and Utah, whereas the Kentucky sheep are on very good pasture land.

Feldman and Miller (1956) found that in a quarter of 141 cases of human congenital toxoplasmosis there was premature birth and they found no evidence from their cases that *Toxoplasma* caused abortion in human beings. Two of the present series of lambs were born at full term, and 4 prematurely.

It is thought that human congenital toxoplasmosis only occurs when a woman becomes infected for the first time during pregnancy and develops a parasitaemia. This is usually asymptomatic and leads to the establishment of a nidus of infection in the placenta from which foetal infection follows. So far as is known, no mother has had a *Toxoplasma*-infected child in any pregnancy subsequent to the one in which she had an infected child. On the other hand, Swiss mice (Beverley, 1959) have infected foetuses in each pregnancy after infection, whether the initial infection is during pregnancy or not. It will be necessary to investigate whether sheep, when once infected, always have infected foetuses, as do mice, or if they behave more like the human female.

This investigation gives one clear indication. It is that *Toxoplasma* infection is common in sheep in Yorkshire. It is tempting to conclude from the finding of *Toxoplasma* in 6 foetuses that the organism was responsible for the abortions. This may be so but it must not be forgotten that *Toxoplasma* is for the most part a harmless (or apparently harmless) commensal.

Further work is necessary to determine the pathogenicity of recently isolated strains of *Toxoplasma* in sheep and to repeat attempts at isolation from field outbreaks of abortion.

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References

BANNATYNE, C. C. (1960). *Vet. Rec.* **72.** 660.
BEVERLEY, J. K. A. (1959). *Nature.* **183.** 1,348.
———, & BEATTIE, C. P. (1952). *J. Clin. Path.* **5.** 350.
BOSWORTH, T. J., & GLOVER, R. E. (1925). *Brit. Vet. J.* **81.** 319.
BUDDLE, M. B., & BOYES, BETTY. (1953). *Aust. V. J.* **29.** 145.
CATHIE, I. A. B. (1957). *Trans. Roy. Soc. Trop. Med. & Hyg.* **51.** 104.
CHRISTIANSEN, M., & SIIM, J. C. (1951). *Lancet.* **260.** 1,201.
COLE, C. R. (1954). *North America Vet.* **35.** 265.
EIDE, G. W. (1957). *Nord. Vet. Med.* **9.** 337.
ENDREJAAT, VON E. (1955). *Deutsche Tierarz Woschr.* **62.**
FELDMAN, H. A., & MILLER, L. T. (1956). *Ann. New York Acad. Sci.* **64.** 180.
GARNHAM, P. C. C., & LAINSON, R. (1960). *Lancet.* **ii. 71.**
GIRAUD, P. (1956). *Bull. Acad. Vet. de France.* **29.** 393.
HADJU, G., LASZLO, R., JÁNES, S., ZOLTAN T. (1958). *Mag. allator. Lapja* **13.** 83.
HARTLEY, W. J., & BOYES, BETTY. (1955). *Proc. N.Z. Soc. Anim. Prod.* **15.** 120.
———, & MARSHALL, S. C. (1957). *N.Z. Vet. J.* **5.** 119.
HOFF, H., & KALDAHL, M. (1954). *Nord. Vet. Med.* **6.** 1.
KEOGH, J., DOOLETTE, J. B., & CLAPP, K. H. (1958). *Aust. V. J.* **34.** 412.
LEECH, F. B., & SELLERS, K. C. (1959). *Agric. Sci.* **52.** 117.
LINDQUIST, K. (1956). *Nord. Vet. Med.* **8.** 320.
M'FADYEAN, J., & STOCKMAN, S. Rep. Dept. Committee appointed by the Board of Agriculture and Fisheries. Part III, 1913.
MARSH, H. (1924). *J.A.V.M.A.* **65.** 203.
———. (1958). (*Adv. in Vet. Sci.*) **4.** 163.
MITSCHERLICH, E. (1954). *Deutsch Tierarz Woschr.* **42.**
NICOLLE, G., & MANCEAUX, L. (1908). *C.R. Acad. Sci.* **147.** 763.
RATCLIFFE, H. L., & WORTH, C. B. (1951). *Am. J. Path.* **27.** 655.
RAWAL, B. D. (1959). *Lancet.* **i.** 881.

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An Outbreak of Ulcerative Enteritis amongst Bobwhite Quail *(Colinus virginianus)*

BY

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SUMMARY.—Heavy mortality in bobwhite quail was attributed to ulcerative enteritis.

The disease has not previously been recorded in Britain.

Introduction

VARIOUS North American workers have described ulcerative enteritis as a fatal, highly contagious disease of quail, grouse, and pheasant. The disease has also been reported in young turkey poults (Bullis & van Roekel, 1944), in domestic fowl (Durant & Doll, 1941; Peckham, 1959) and in European partridge (Durant & Doll, 1941). It appears to be essentially a disease of confinement. Bass (1941) states that it is virtually unknown among wild bobwhites but Buss, Conrad and Reilly (1958) report an outbreak in wild Californian quail and Durant and Doll (1941) describe cases in wild turkey.

There are no references to the occurrence of ulcerative enteritis in Britain apart from a suggestion (Durant & Doll, 1941) that the "grouse disease" which affected English grouse in 1817 was similar to, if not identical with, this condition.

In the United States the disease most commonly affects intensively reared bobwhite quail and is seen in its more virulent form in flocks of young birds in late summer, particularly if they are overcrowded. There is a direct relationship between disease incidence and density of stocking. Mortality is often over 85 per cent. and is sometimes spread over a period of weeks. The few that recover, and those that prove insusceptible, may continue to thrive but are potential carriers; such birds have shown a strong resistance to infection on subsequent exposure to spontaneous disease. In the acute form signs of disease may be absent and affected birds are found dead. Chronic infection, which appears to be more common, is characterised by dullness, ruffled feathers, progressive emaciation, and is usually fatal. Diarrhoea is not a constant symptom but has been reported in a number of cases, mainly those of the acute type.

There is disagreement amongst North American workers as to the identity of the causal agent although the bulk of published work indicates that it is not filter-passing. Morley and Wetmore (1936) claimed that the causal organism was *Corynebacterium perdicum*. They stated that this diphtheroid produced typical lesions in susceptible quail and maintained its virulence after serial passage. Bass (1939) and Durant and Doll (1941) failed to substantiate these claims, and Bass (1941) later described repeated isolations of an anaerobic gram-negative rod and successful transmissions with this isolate. Durant and Doll (1941) found anaerobic cultures consistently negative. Peckham (1959) isolated a gram-positive anaerobic spore-forming bacillus by inoculating material from affected quail and chickens into the yolk sacs of developing eggs. He also transmitted the disease to susceptible quail using a yolk suspension of this bacillus. Paratyphoid organisms and members of the *Escherichia coli* and paracolon groups have been incriminated by other workers but convincing evidence of successful transmission is lacking. There is no evidence that protozoa are directly involved in the aetiology although *Coccidia* have been reported in the intestines of affected birds. Inclusion bodies have not been described.

Case History

The present outbreak occurred on a poultry farm housing deep-litter broilers, turkeys, a wide variety of game and ornamental birds, and waterfowl. The disease was confined to a group of bobwhite quail although pheasant, partridge and grouse were all at risk. It is of interest that four English partridges reared in the same brooders as the diseased quail remained unaffected.

Two hundred bobwhite quail eggs had been imported from the United States, and a 75 per cent. hatch obtained in July, 1959. The birds were housed in outdoor wooden brooders in which the grass floor had been cut short and covered with fine sand. An infra-red dull-emitter lamp provided warmth until the third week, when the birds were allowed access to an external wire-netting run. Feeding consisted of partridge starter meal and chopped lettuce leaves.

Ovine Abortion and Toxoplasmosis in Yorkshire.—*Concluded.*

ROEVER-BONNET, H. (1958). *Tidj. voor Diergeneeskunde.* **83.** 1,073.
RYFF, J. F., & LEE, A. M. (1945). *A.J.V.R.* **6.** 149.
SABIN, A. B., & FELDMAN, H. A. (1948). *Science.* **108.** 660.
SANGER, V. L., CHAMBERLAIN, D. M., CHAMBERLAIN, K. W., COLE, C. R., & FARRELL, R. L. (1953). *J.A.V.M.A.* **123.** 89.
——, & COLE, C. R. (1955). *Am.J.V.R.* **16.** 536.
SELLERS, K. C., & LEECH, F. B. (1955). *J. Agric. Sci.* **46.**
SHEARER, G. C. (1957). *Vet. Rec.* **69.** 693.
SINCLAIR, W. B. V. (1955). Unpublished data.
SPRUM, L. (1953). *Nord. Vet. Med.* **5.** 995.
STAMP, J. T., MCEWEN, A. D., WATT, J. A. A., & NISBET, D. I. (1950). *Vet. Rec.* **62.** 251.
S.W.J. VAN RENSBERG., VAN HEERDEN, K. M., LE ROUX, D. J., & SNYDERS, A. J. (1958). *J. S. Af. V.M.A.* **29. 3.** 223.
TUCKER, J. O., & ROBERTSTAD, G. W. (1956). *J.A.V.M.A.* **129.** 511.
WATSON, W. A. (1960). *Vet. Rec.* **72.** 62.
WICKHAM, N. W., & CARNE, H. R. (1950). *Aust. V.J.* **26.** 1.
YOUNG, S. (1953). *Vet. Rec.* **65.** 247.
——, PARKER, H., & FIREHAMMER, B. D. (1958). *J.A.V.M.A.* **133.** 374.

At 4 weeks the birds were equally divided between 2 brooders and within a few days a number in each group became listless and died. The mortality continued until at 6 weeks, 96 of the 150 birds had died. Soluble chlortetracycline* in the drinking water at the rate of 200 mg. per gallon reduced mortality but fresh cases continued to develop. During this period a number of *post-mortem* examinations were made by the owner or his agent. One such, when the birds were 6 weeks old, disclosed haemorrhagic enteritis, and the survivors were therefore treated for coccidiosis. Sporadic losses continued up to 12 weeks of age, when a sharp rise in mortality occurred. The owner then submitted a number of dead birds for *post-mortem* examination.†

Twelve specimens were examined. The most striking feature was a chain of greyish-yellow plaque-like lesions visible through the serous surface of the intestines and extending, in most cases, the whole length of the duodenum. In some the rectum was also involved but caecal lesions were rare. Some lesions were rounded, some polygonal, but none was raised above the serous surface. Penetration had occurred in a number of sites so that peritonitis was a common finding, whole loops of intestines being firmly bound by a mass of sero-fibrinous exudate. Examination of the mucosal surface showed the lesions to consist of yellowish rounded areas of necrosis from 1 to 6 mm. in diameter, coalescing in parts into more extensive polygonal forms. Stripping the necrotic material frequently revealed a shallow ulcer which in some instances had penetrated the gut wall. Examination was rendered difficult by the extreme fragility of the affected intestines which often disintegrated on touch. In no case was haemorrhage apparent. Intestinal contents were scanty but of normal appearance. Six of the 12 specimens showed hepatic involvement, with innumerable pinpoint foci of necrosis scattered widely throughout the parenchyma. No changes were seen in any other viscera.

A series of microscopical examinations of scrapings of intestinal mucosa taken from varying levels and from each bird, was consistently negative for any indication of protozoan or helminth infestation. Aerobic cultures were prepared from the livers and from intestinal lesions, material being plated onto 5 per cent. sheep-blood agar, MacConkey's agar and desoxycholate citrate agar, and inoculated into selenite broth. Incubation of these cultures at 37° C. for 4 days yielded a light growth of *Escherichia coli* from the livers of 2 birds, and a profuse mixed growth of coliform organisms from the intestinal lesions. These organisms did not belong to any of the serotypes known to be associated with avian disease. Anaerobic cultures and transmission experiments were not attempted.

Histopathology

This was essentially as described by Durant and Doll (1941), being characterised in the intestine by total destruction of the mucosa in ulcerated areas with involvement of the underlying layers, which were penetrated in places. Masses of bacteria were trapped in ulcer debris. The liver lesions comprised clearly demarcated foci of necrosis scattered widely throughout normal parenchyma.

Treatment

After a tentative diagnosis of ulcerative enteritis had been given, the drinking water was medicated with chlortetracycline at the rate of 200 mg. per gallon, but this was replaced 2 days later by furazolidone‡ in the food at 0.04 per cent. From this times losses virtually ceased and the condition of the few remaining birds, most of which were ailing, began to improve. No further cases occurred and, after a further fortnight, the 20 or so survivors were looking better and beginning to thrive.

Discussion

At the time of *post-mortem* examination, the full significance of the lesions was not appreciated, resulting in certain regrettable omissions, notably anaerobic cultural techniques and transmission experiments. In the absence of experimental quail, successful transmission may not have been achieved but should have been attempted. Losses ceased soon after a tentative diagnosis had been given, so that no further material became available. Diagnosis is therefore based on clinical findings, necropsy, and histopathology.

The importance of this disease amongst birds in the United Kingdom would appear to be threefold:—

(1) The increasing demand of the luxury market for quail both for eating and as ornamental birds.

(2) The potential spread of the disease to pheasant-rearing farms.

(3) The potential spread of the disease to chicken and turkey farms if it becomes endemic.

Haemorrhage into the intestines, characteristic of the early stages of the disease, could understandably be attributed to coccidiosis by the lay observer. Treatment for coccidiosis would probably produce a transient fall in mortality, but could be followed by a reassertion of virulence in which birds might die quickly, showing the characteristic intestinal ulceration.

It is difficult to account for the origin of infection in this outbreak but some suggestions follow, consideration of which might form the basis for future work. Infection may have originated from a carrier bird of another species, or may have been egg-transmitted. The latter possibility suggests an incubation period of about 4 weeks, which is at least twice that recorded by Durant and Doll (1941), and greatly exceeds the average experimental incubation period of 4 days reported by Shillinger and Morley (1934). A further possibility is that a latent infection, originally derived either from a carrier or from egg-transmission, was precipitated by the change in management when the birds were 4 weeks old. Similar mechanisms are known to be involved in enteric infection in pigs. Infection, either latent or

* Aureomycin.

† See plate facing page 16.

‡ Neftin.

(*Concluded at foot of page* 13)

Mesenteric Cyst in the Dog

BY

FRANK JAGGER

Shrewsbury

IF the author's search of contemporary veterinary literature has been faithful enough, mesenteric cyst has not been reported in the dog. The fact that it is usually only found in association with other conditions, or is discovered at autopsy, probably accounts for this lack of information, for it must be more common than is generally supposed.

In man, however, although mesenteric cysts are rare—as indeed are all mesenteric tumours, and it has been said that many surgeons do not encounter one in the course of a surgical life-time—their treatment, and more particularly their origin, have attracted the attention of many authors. Many papers have appeared on the subject since a mesenteric cyst was first recorded as an anatomical curiosity by Benivieni, the Florentine anatomist, in 1507.

Mesenteric cysts may be defined as cysts situated between the leaves of the mesentery of the small and large bowel. They are well defined and are only attached to surrounding structures by loose areolar tissue. While the majority occur in association with the small bowel, mainly the ileum and jejunum, they may occur anywhere along the intestine from the duodenum to the rectum.

Case Report

A 4-month-old Labrador bitch was presented with a vague history of abdominal discomfort which had been present apparently for at least 24 hours. During this time there had been vomiting and the passage of watery blood-stained faeces. On examination the animal did not appear greatly distressed; temperature was not elevated and the pulse was 120 to 130. The mucous membranes were pale and dry. The abdomen was sufficiently relaxed to allow the palpation of a sausage-shaped mass extending from the xiphisternum to the region of the right iliac fossa. A provisional diagnosis of intussusception was made and emergency laparotomy was advised.

Operation

Under chlorpromazine* and pentobarbitone sodium† anaesthesia, the abdomen was opened through a right para-median incision. An intussusception was delivered and found to involve the jejunum and ileum, passing into the colon. Reduction was effected without difficulty until the terminal portion was reached. This appeared as a torn, confused and oedematous mass which was black at one point. It was clear at once that the only hope lay in bowel resection. This was carried out, and continuity was re-established by means of a two layer end-to-end anastomosis. The mesenteric defect was obliterated and the abdomen was closed in layers. The wound healed by first intention and the skin sutures were removed 7 days later.

The subsequent progress was equally satisfactory and the animal remains fit at the time of writing, 12 months after the operation.

Careful examination of the specimen revealed a gangrenous and ruptured loop, which within its mesentery contained what at first appeared to be a dilated portion of bowel, but which, on incision, was found to have no continuity with the loop. The swelling was in fact a thick walled cyst having a

* Largactil. † Sagatal.

An Outbreak of Ulcerative Enteritis amongst Bobwhite Quail.—*Concluded.*

direct, could have arisen from penetration or contamination of the egg shell, and in this connexion the sporulating anaerobe recently demonstrated by Peckham (1959) is of interest in this outbreak, particularly as Kirkpatrick and Moses (1953) have shown the faces of recovered cases to be infective to susceptible birds.

Acknowledgments.—The author wishes to thank Mr. R. B. A. Carnaghan, M.R.C.V.S., for preparing sections for histopathology, and Mr. F. H. Summerfield, A.R.P.S., for the photomicrographs.

References

BASS, C. C. (1939). *Proc. Soc. exp. Biol. N.Y.* **42.** 377.
———. (1941). *Ibid.* **46.** 250.
BUSS, I. O., CONRAD, R. D., & REILLY, J. R. (1958). *J. Wildlife Mgmt.* **22.** 446.
BULLIS, K. L., & VAN ROEKEL, H. (1944). *Cornell Vet.* **34.** 318.
DURANT, A. J., & DOLL, E. R. (1941). *Res. Bull. 325 Mo. agric. Exp. Sta.*
KIRKPATRICK, C. M., & MOSES, H. E., & BALDINI, J. T. (1950). *Poult. Sci.* **29.** 561.
———. (1952). *Amer. J. vet. Res.* **13.** 99.
———. & ———. (1953). *J. Wildlife Mgmt.* **17.** 24.
MORLEY, L. C. & WETMORE, P. W. (1936). *Proc. N. Amer. Wildl. Conf.* 471.
PECKHAM, M. C. (1959). *Avian Dis.* **3.** 471.
SHILLINGER, J. E., & MORLEY, L. C. (1934). *J. Amer. vet. med. Ass.* **84.** 25.

Addendum

Two further outbreaks in quail were diagnosed after this paper was prepared. One occurred on the same farm a year later but affected crested quail only (*Lothortyx c. californica*). The second was in bobwhites.

Diagnosis was based on the history and *post-mortem* findings. In each case the pattern of disease was similar to that described above.

smooth glistening lining and containing thin clear fluid. Measurements of the uncollapsed cyst were approximately 8 cm. by 3 cm. The picture presented is indicated in the diagram (Fig. 1). (It is regretted that the cyst contents were not retained for analysis as this might have provided an additional clue to the origin of this particular cyst.)

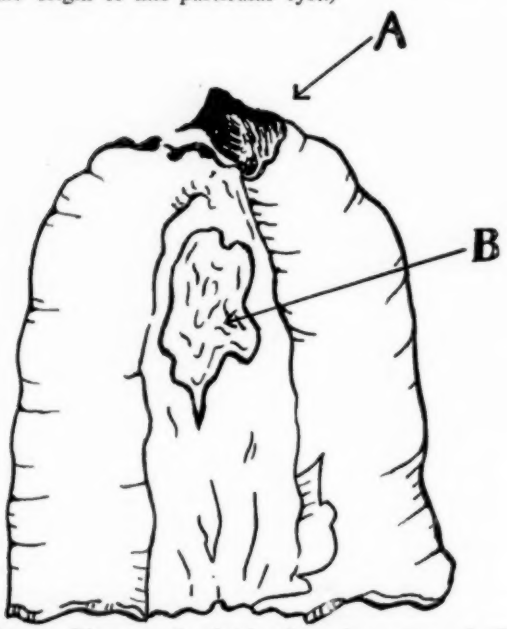

FIG. 1.—Diagrammatic sketch of specimen removed x2. A. Perforated gangrenous apex of loop. B. Mesenteric cyst (opened and collapsed).

A portion of the cyst wall was sent for histological examination and was reported on as follows:—

"Microscopically the cyst is lined in places by a single layer of flattened cells. In many areas the lining consists of homogeneous eosinophilic material which stains blue with Mallory's phosphotungstic acid haematoxylin indicating that it is fibrin (Fig. 2).*

"The wall of the cyst is formed of richly vascular fibrous tissue devoid of any inflammatory cell infiltration, the profusion of capillaries almost suggesting a haemangioma. No abnormality was seen in the attached intestine.

Conclusion

"This is a mesenteric cyst with nothing to suggest that it is of intestinal origin. Similarly, malignancy and inflammatory conditions can be excluded and there is no evidence of parasitic infestation. Most probably it is developmental in nature perhaps arising as a degenerative change in a haemangioma."

Discussion

Before passing to a consideration of the mode of origin of mesenteric cysts it would be perhaps helpful to record a classification of mesenteric cysts in general.

While there has been a good deal of confusion about this, most authors appear to have based their classifications on that given by Dowd (1900) and a modification appropriate to the needs of this paper might be:—

(a) True mesenteric cysts.
(b) Dermoids.
(c) Cystic malignant disease.
(d) Parasitic cysts.

Our concern, here, however, is only with the true mesenteric cysts. It seems likely that all true mesenteric cysts have their origin from one of the following categories.

(a) *Sequestration*—Convincing evidence of the theory of origin by sequestration was given by the work of Lewis and Thyng (1907). In their study of comparative embryology they established the fact that the production of diverticuli is a regular occurrence in the embryonic development of the gut. They showed that diverticuli frequently occurred in the embryo rabbit, pig and sheep, and suggested that sequestration of such diverticuli produced mesenteric cysts.

(b) *Traumatic*—Moynihan (1897) supposed that many mesenteric cysts were formed by the dilatation of lymph channels or the development of cystic spaces in the lymph channels and lacteals, and suggested that they might be of traumatic origin and derive from the degeneration of mesenteric haematomata—admitting, however, that re-absorption was the more common fate of such haematomata.

(c) *Embryonic Remnants*—Most authors are attracted by the theory of Dowd (1900) that true mesenteric cysts are produced from the persistence of embryonic remnants of the pro-nephros and mesonephros, with subsequent displacement of the cyst between the layers of the mesentery.

The histology of the wall and analysis of the contents must provide the clues to the genesis of any particular cyst. Thus, while the discovery of primitive glomeruli would indicate the persistence of an embryonic remnant of the Wolffian body, the presence of columnar epithelium and possible unstriped muscle would point to an origin from an intestinal sequestration, and evidence of an old haemorrhage might well suggest a degenerated haematoma or haemangioma.

That analysis of the cyst contents alone may prove misleading is shown by a case reported in man by Paul (1947). Here the histological structure of the cyst wall showed it to be identical with that of the small intestine, leaving no doubt that it arose as an intestinal sequestration, yet the contents of the cyst was chyle, suggesting that it was produced by the dilatation of a lacteal vessel. This lends strong support to the view that the fluid content of a cyst is at times an accidental circumstance, determined by the opening up a lymph or chyle vessel into the lumen of an already established cyst.

There can be little doubt that in the case described the presence of the mesenteric cyst led to the de-

(*Concluded at foot of col. 1 opposite*)

* See plate facing page XXV.

Current Literature

REPORT

Province of Saskatchewan Department of Agriculture: 8th Annual Report of the Director of the Animal Industry Branch for the year ended March 31, 1959.

Saskatchewan, a province of Canada larger than the whole of France but with less than a million inhabitants, lies in the heart of the prairie lands at a height of 1,500 to 3,000 feet above sea level. The fertility of the soil is almost inexhaustible, and the agricultural industry of the province has made phenomenal progress. In parts of the province stock raising is still carried on as a primary industry, whereas the livestock production of the Dominion at large is for the most part a subsidiary of mixed farming. Cattle (1.86 million), poultry (9 million) and pigs (890,000) are the chief forms of livestock. Interest in sheep is increasing but horses have decreased over recent years to 148,000.

This Report contains a full and well documented account of the livestock industry of the province together with some good photographs of prize winning animals which, if they are typical, show what excellent stock is produced.

The Animal Industry Branch of the province's Department of Agriculture comprises four divisions—dairy, livestock, poultry and veterinary. Each division operates various schemes designed to improve or increase the different species of livestock. For example premiums are payable to farmers who breed only from "registered" approved mares, stallions, and bulls; improved rams and boars are distributed and sold at below cost price; financial assistance is given for warble-fly control campaigns; and poultry flocks are tested for B.W.D.

The Report records that the dairy products during 1958 were worth over $50 million; ice cream is fast becoming an increasingly important product and represented nearly 7 per cent. of dairy product sales. Other items of interest which catch the reader's eye are that all brands used on livestock—and there are some 13,000 of them—must be registered with the Department of Agriculture, which keeps the Royal Canadian Mounted Police informed, that all dealers in livestock, wool, and poultry products, and all poultry hatcheries have to pay a substantial surety bond and an annual licence fee, and that the Department gives financial help to producers of poultry and livestock to exhibit and compete in provincial and Dominion fairs.

Saskatchewan's natural conditions of large farms and fairly small dairy herds resulted in the province being later in adopting artificial insemination on an extensive scale than many other areas. However, the refinements in techniques in processing and handling frozen semen are now bringing the advantages of artificial breeding to many districts of the province. Several artificial breeding co-operatives have already been established; these co-operatives are given government grants in their first year. During the year 3,644 cows were artificially mated, 80 per cent. of them to dairy bulls.

A veterinary service operates in the province somewhat on the lines of the New Zealand "club" system. Under the Veterinary Services Act provision exists for one or more rural municipalities to form a "veterinary service district." The district obtains a veterinarian who receives a fixed grant (minimum $2,000) according to the size and cattle population of the district; he is then obliged to serve all resident farmers in the district on a uniform scale of fees throughout, no charge being made for mileage. During the year 35 districts were manned and operating.

The veterinary division is under a Provincial Veterinarian (Dr. V. E. Senior, M.R.C.V.S.). Judging from the Report the province has a high standard of animal health. In cattle contagious abortion continues to be the major infectious condition of province-wide importance and national concern, although haemorrhagic septicaemia and clostridial diseases (blackleg, malignant oedema, and enterotoxaemia) were the causes of fatalities in widely scattered areas. Accidental poisoning by lead and arsenic is not uncommon, and mineral and vitamin deficiencies are thought to be the primary cause of many cattle sicknesses reported.

Mesenteric Cyst in the Dog.—*Concluded.*

velopment of intussusception. The intussusception was the logical consequence of the increased peristaltic activity produced by the irritation of the cyst, and could be regarded as nature's effort to get rid of the irritant.

It is difficult to see, however, how a mesenteric cyst could be diagnosed without the complications with which it is associated. These, apart from intussusception, might well be intestinal obstruction or adhesions. In this case recovery could not have taken place had not the loop containing the cyst been resected. If gangrene had not been present it might have been possible to dissect out the cyst without jeopardising the blood supply of the bowel. Where massive cysts occur in situations where enucleation or resection is not possible, marsupialisation would appear to be the only reasonable course of action.

Acknowledgments—I acknowledge with grateful thanks the assistance of J. A. Baty, O.B.E., F.R.C.S., in the preparation of the diagram and Dr. Michael Simons for the report on the specimen.

References

BENIVIENI. (1507). "De Abditis Nonnulis ac Mirandis Morborum et Sanctorum Causis." Florence.
DOWD, C. N. (1900). *Ann. Surg.* **32**. 515.
LEWIS, F. T., & THYNG, F. W. (1907). *Amer. J. Anat.* 7,505.
MOYNIHAN, B. G. A. (1897). *Ann. Surg.* 261.
PAUL, M. A. (1947). *Brit. J. Surg.* **35**. 311.

Illus. - plate following p. 16.

Contagious abortion in cattle is now tackled under a programme administered by the Federal Government's Health of Animals Division in a nation-wide campaign. The scheme is voluntary, blood-testing is free, and compensation is paid for reactors. Vaccination of heifer calves at a small fee completes the scheme. During the year nearly 37,000 animals were blood-tested; 5.5 per cent were positive. Calfhood vaccinations numbered 165,100.

Testing for bovine tuberculosis is also a Federal responsibility. The disease is said to be of low incidence in the province.

Parasitism is an important cause of economic loss in sheep. Rhinitis continues to be a problem to pig breeders, and although not often seen in acute form it remains chronic in many herds. Enteric complaints, particularly in young pigs, are beginning to constitute a problem of some magnitude; imperfect feeding of the pregnant sow is suspected to be a factor. Erysipelas in swine declined, as did also encephalomyelitis in horses.

Tuberculosis, leucosis, fowl cholera, coccidiosis, and chronic respiratory disease, continue to trouble the poultry industry.

A scholarship plan exists to attract students into the veterinary profession to serve the province and ease the staffing shortage in the Division which, at the end of the year, was causing considerable concern.

W. E. L.

BOOK REVIEWS

Animal Health Yearbook, FAO-OIE, 1959. H.M.S.O., London (1960). 12s. 6d.

This is the fourth annual world livestock disease report issued jointly by FAO and OIE. About two-thirds of the book consists of tables giving the incidence of the diseases of livestock in the countries that are members of the two organisations, nearly 120 in all. There follow tables dealing with diseases of bees and fish and with livestock populations. The last of these tables this year includes for the first time the numbers of veterinarians in the different countries. They range from over 42,000 in the U.S.S.R. down to a single one in Zanzibar and Basutoland.

A short section mentions the important changes in disease incidence during 1959. They include the recognition of blue tongue and horse sickness in West Pakistan, rinderpest in Afghanistan, and swine erysipelas in Cyprus. Bovine tuberculosis has been eradicated from the Netherlands and Switzerland and Brucellosis from Denmark except for occasional isolated cases. Swine fever has not occurred in Ireland since May 1958; it was eradicated in 1938 and the country remained free until August, 1956. Sections deal with tick-borne infections and *Vibrio fetus* infection. Maps show the distribution of foot-and-mouth virus types based on information from the World Reference Laboratory at Pirbright. Finally, Dr. F. W. Nielsen, the Chief Veterinary Officer in Denmark tells the story of the eradication of brucellosis. When the eradication campaign began about 25 per cent. of the 190,000 herds were infected. The principles of the scheme were 3-monthly ABR tests on herd milk, serological tests to detect infected animals, and compulsory slaughter of reactors with compensation. Vaccination is used only in infected herds and then only with official approval. Between 1950 and 1956 between 20,000 and 40,000 animals were slaughtered each year: in 1959 not many more than 1,000 cattle were slaughtered and over 99 per cent. of the herds were registered as brucellosis-free.

Everyone interested in the world picture of animal disease will need to consult this book: it is published so cheaply that it is well worth a place on one's own bookshelf.

Standardmethoden der tierärztlichen Milchuntersuchung (Standard methods of examining milk). By W. SCHONHERR. Gustav Fischer, Jena (1960). 18.15 DM.

This small handbook gives details of methods for examining milk which have been shown by experience in Germany or other countries to be suitable for use as standard methods. They include techniques for sampling milk, carrying out plate counts, culturing pathogenic organisms or detecting them by serological or animal inoculation methods, determining the various chemical constituents of milk, and finally its specific gravity and freezing point. The text is copiously illustrated with photographs, many of them in colour. The author is Director of the Section of Milk Hygiene and Udder Diseases of the Institute for Research on Infectious Diseases of Animals in Jena and he is anxious that the veterinary profession in Eastern Germany should take more interest in the field of milk examination and play its proper part in the provision of clean and safe milk.

This is a reference book designed to show which techniques might reasonably be adopted as standard ones and perhaps later be recognised by legislation. A Seven Year Plan to increase milk production by one-half is in being in Eastern Germany and so the time is ripe for veterinarians to take an interest in milk hygiene with the help of simple and uniform tests, hence this book.

The Dog Business. Douglas Appleton. Popular Dogs Publishing Co., London (1960). 21s.

If the inclusion of the title "The Dog Business" causes surprise to those expecting to find only names pertaining to the scientific field then our excuse must be that we ourselves were surprised that we felt impelled to review it! As the name implies, this book reviews the whole field of dog breeding, selling, exporting, boarding and many ancillary services and as such will have no place in the library of most veterinary surgeons, but it is so packed with sound common-sense information and so much practical detail that members of the profession may think it worth noting for recommendation to clients and others proposing to start dog breeding or boarding kennels and even to those aspiring to a post in such establishments. The chapter on Dog Export, Transport, Import, is more than helpful and the information regarding import regulations of various countries

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A. H. HARRIS.— AN OUTBREAK OF ULCERATIVE ENTERITIS AMONGST BOBWHITE QUAIL (*Colinus virginianus*)

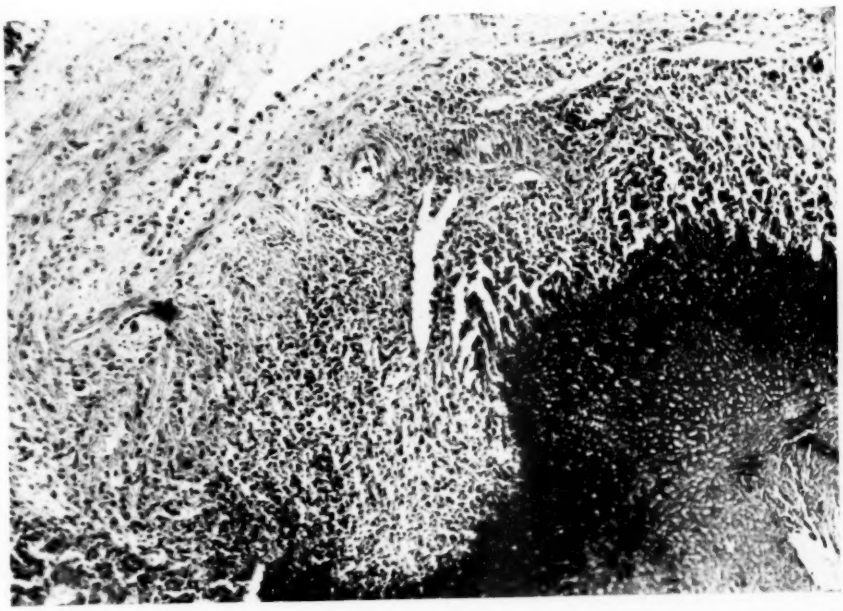

PLATE I.—Shows an ulcerated area of intestine. There is a clear line of demarcation at the edge of the ulcer.

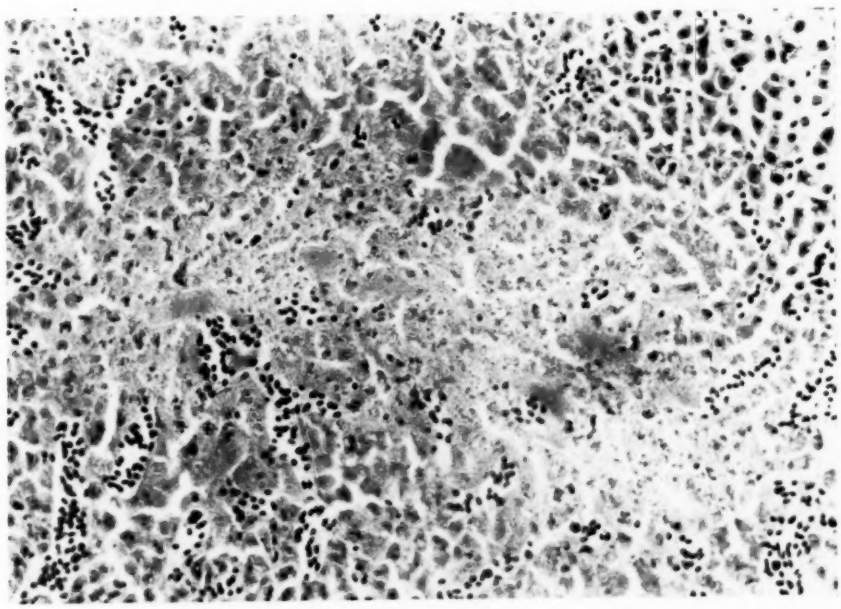

PLATE II.—A necrotic focus in the liver of the same quail.

FRANK JAGGER.—MESENTERIC CYST IN THE DOG

FIG. 2.—Mesenteric Cyst in the Dog. Indicating lining of flattened cells and strength and vascularity of wall.

News and Comment

THE NEW YEAR HONOURS

C.V.O. Knighted

Members of the profession will have learned already from their newspapers that, in the New Year Honours, the Queen has been graciously pleased to bestow upon Mr. J. N. Ritchie, C.B., Chief Veterinary Officer, Ministry of Agriculture, Fisheries & Food, the honour of Knighthood. Everyone's good wishes and congratulations will go out to Sir John Ritchie at this well-earned mark of the Sovereign's esteem which not only rewards long and distinguished service, but comes most happily at a time when Sir John's recovery from illness has given relief to all his friends. This New Year Honour is one not only to its recipient, but to the Service of which he is the Chief, to the Royal College whose President he is, and indeed to the whole profession of veterinary surgery.

Another well-known name in the List, which will give especial pleasure to our Welsh readers is that of Mr. W. T. Rowlands, who is awarded the O.B.E.

Mr. Tom Williams, a former Minister of Agriculture and a good friend of the profession, receives a life Barony, and Mr. W. H. Long, Permanent Secretary to the Ministry of Agriculture of Northern Ireland, is raised to the honour of C.B.

DRESSING AGAINST THE WARBLE-FLY

A note from the Ministry of Agriculture states that ready-made derris preparations, as an alternative to powdered derris diluted with water, may now be used for the compulsory dressing of cattle infested with warble-fly. Dressing is required to take place each year during the period March 15th to June 30th.

Compulsory dressing will, in future, apply to cattle where the warble-fly maggot is discernible by touch (*e.g.* in long-haired beasts) as well as to those visibly infested. These changes in the regulations have the support of the National Farmers' Union.

FIRE AT BAYER LABORATORIES

A number of laboratories at the Bayer Biological Institute were severely damaged by a fire which started in the early hours of last Sunday morning. It was thought to be due to an electrical fault. The main research laboratory was severely damaged, but the production unit was fortunately left intact. A quantity of vaccines in the despatch store were damaged by the water used by the fire brigade.

MR. L. ST. BEL GOLLEDGE

The profession was strongly represented at the memorial service to Mr. L. St. Bel Golledge which was held in Sherborne Abbey. The service was conducted by Canon S. B. Wingfield Digby (vicar of Sherborne) and the address was given by the Rev. T. F. Taylor. Among veterinary surgeons present in the large congregation were: Mr. H. F. Hebeler representing the B.V.A. and the Society of Practising Veterinary Surgeons, Mr. G. Atkinson, representing the Western Counties Veterinary Association, Mr. R. A. Brown, Mr. G. L. Barker, Mr. H. L. Trump, Mr. J. J. Yeats, representing the Mid-West Veterinary Association and the Bristol Veterinary School, Mr. N. D. Coles, representing The Southern Counties Veterinary Medical Association, Mr. A. Alexander, Mr. M. H. Woodford, Mr. H. S. Davies, Mr. P. R. Greenough, Major W. Blanshard, Mr. J. Cripps, Major E. F. Beckett, Mr.

Book Reviews.—*Concluded.*

could serve as a ready reference for busy veterinary surgeons.

In the chapter on kennel organisation appears a section headed "Your Veterinary Surgeon"—if only more people would organise their relationship with their veterinary surgeons on something along the lines suggested here, there would not only be no dissatisfied clients but a great reduction in the number of practitioners suffering from stress illnesses!

Altogether a sound book based on a wide practical experience which is the type that is always most convincing.

Spezielle Tierseuchenbekämpfung. By L. HUSSELL. Gustav Fischer, Jena (1960). 32.10 DM.

This book gives an account of the methods used in Eastern Germany to control infectious diseases of livestock. Its author is director of the Institute of State Veterinary Science and Hygiene in the Karl Marx University in Leipzig. It is the first book on the subject published in the country since the war and it contains a wealth of information about the incidence and control of diseases of livestock in Eastern Germany. It also contains information about the organisation and activities of the veterinary profession and the mass of veterinary legislation which has been introduced in recent years, including a list of fees for almost every conceivable veterinary operation or service to animal owners.

The book is of special interest to those concerned with state veterinary medicine for it shows how countries of the Russian bloc are tackling animal disease. Poultry meat, wool, and honey all amount to 6,000 to 7,000 tons a year in Eastern Germany, there were nearly 500 cases of rabies there in 1958, and the U.S.S.R. has some 17,000 veterinary students and 42,000 veterinary surgeons aided by 50,000 technicians—these are a few of the interesting sidelights which the text provides. There are only a few illustrations, but they include some very striking ones of rabies, Teschen disease, and Borna disease. Almost all the references are to work published in Germany and this is a book that is intended for urgent internal use—the author was asked to write it at once even though new schemes for controlling some diseases of livestock were to be brought in shortly.

E. R. Tazewell, Mr. P. W. D. Thornton, Mr. Barclay Watson, Mr. W. Mackinnon, Mr. W. C. Auld, and Professor A. Messervy.

FOOT-AND-MOUTH DISEASE

We have been asked by the Animal Health Division once again to draw the attention of all veterinary surgeons to the fact that if the stamping out policy for foot-and-mouth disease is to succeed, it is essential to have early reporting of any suspicion of this disease.

Veterinary surgeons in the course of their practice should always bear this in mind and must realise that the whole-time veterinary officers are happy to investigate or to consult with them whenever they come across any suspicion of the disease, however slight. Particularly it should be stressed that it is difficult to countenance any delay in reporting when the disease is known to be present in the country. Veterinary surgeons might also assist by advising clients to report any suspicion of the disease without delay. In addition, the need for personal disinfection between cases should be borne in mind.

"INTERFERENCE" ON MOBILE TRANSMITTERS

It has been brought to the notice of the B.V.A. that members who use mobile radio services in their cars are caused considerable inconvenience by reason of the large number of other subscribers on the same wave-bands. Representations are being made to the Postmaster-General on the subject, with a request that applications from veterinary surgeons to be placed on high frequency wave-bands should be treated sympathetically.

In the meantime, will members be good enough to report to the Association any difficulties they encounter in the use of their transmitters.

WORLD VETERINARY ASSOCIATION

List of Diseases of Animals

The Secretariat of the Permanent Committee of the World Veterinary Association invite firm orders for the List of Diseases of Animals prepared by the Committee for the compilation of the list under the direction of Mr. W. A. Pool.

The list has not yet been sent to the printers and the editors are not willing to take the risk of publication unless firm orders are received for not less than 1,500 copies. Mr. W. A. Pool, Ingoldby, 9 Effingham Road, Surbiton, Surrey, has generously offered to receive the names and addresses of potential subscribers which will be forwarded to the Secretary-Treasurer of the World Veterinary Association.

It will be appreciated if orders are sent to Mr. Pool giving the name and address of the sender, together with his signature. The price of the list is estimated at £1 10s. 0d.

NEW INVESTIGATION CENTRE

A new Veterinary Investigation Centre under the control of Mr. W. H. Parker has been established at Thirsk to serve the North Riding of Yorkshire. It is hoped that veterinary surgeons in general practice in the North Riding will utilise the facilities now available at Thirsk.

The address of the new Centre is:—

Ministry of Agriculture, Fisheries and Food, Veterinary Investigation Centre, West House, Station Road, Thirsk, Yorkshire. Telephone No. Thirsk 2065/6.

ELECTION OF R.C.V.S. COUNCIL MEMBERS

In accordance with the provisions of the Veterinary Surgeons Act, 1948, 5 members of the Council, who must be members of the Royal College, will be elected in 1961 by members of the Royal College residing outside the Republic of Ireland.

Five present members of Council will retire at the Annual General Meeting in 1961 and are eligible for re-election, namely:—

R. F. Montgomerie, Esq., PH.D., B.SC., F.R.C.V.S., Wellcome Research Laboratories, Langley Court, Beckenham, Kent; G. Atkinson, Esq., M.R.C.V.S., 4 Compton Grove, Nairn Road, Canford Cliffs, Dorset; L. G. Anderson, Esq., D.V.M., M.R.C.V.S., 49 Cambridge Street, Aylesbury, Bucks.; T. M. Mitchell, Esq., M.R.C.V.S., D.V.S.M., Briony, Meadowfield Road, Stocksfield-on-Tyne, Northumberland; and Professor R. Lovell, D.SC., PH.D., M.R.C.V.S., D.V.S.M., Royal Veterinary College, Camden Town, London, N.W.1.

The term of office of the 5 persons elected in the place of the 5 members retiring by rotation will be 4 years.

Nominations of persons for election to the Council must be submitted in writing on a form which may be obtained from the undersigned, and which must be returned to him duly completed on or before January 31st, 1961.

Each such nomination form must bear the signature of the proposer and seconder, who must not be present members of Council, and must be countersigned by the nominee.

W. G. R. OATES,
Registrar
Veterinary Surgeons Acts, 1881-1948
College House,
Wright's Lane,
Kensington, W.8.

UNIVERSITY NEWS

Cambridge

The Wellcome Foundation Prize (consisting of £20 in books) for the best student in animal pathology in 1960, has been awarded to Mr. A. V. Edwards of Fitzwilliam House.

The Allen and Hanbury Prize (consisting of £20 in books) for the best student in veterinary parasitology in 1960 has been awarded to Mr. D. I. B. Hoare, of Queens College.

Edinburgh

The undermentioned candidates have passed the second professional examination in the subjects of veterinary anatomy and histology and veterinary physiology and biochemistry for the degree of Bachelor of Veterinary Medicine and Surgery:—

Brown, Paul; Burney, John: Carnegie, David Boon; Carstairs, William; Cran, Hugh Ross; Dale, Stephen John;

Dobson, Keith Burns; Eden, Donald Thomas; Fielding, Michael Joseph; Gibbons, Robert William; Gill, Anthony Henry; Harding, Clifford; Henson*, Peter Mitchell; Le Page, Richard William Falla; Naish, Nicholas George; Stewart, Anthony Capsey; Sutherland, Colin Donald; Tretheway, John Coad; Veitch, Liana Margaret; Wilson, Alan John; Windsor, Roger Stanley; Wray, Clifford; and Yelland*, Patricia Anne.

* Pass with Distinction in Veterinary Anatomy and Histology.

The undermentioned candidates have passed in the subjects of veterinary anatomy and histology of the second professional examination for the degree of Bachelor of Veterinary Medicine and Surgery:—

Gardner, Ronald Ellis; Hall, Paul Guy; and Holland, Roy Eric.

The undermentioned candidates have passed in the subjects of veterinary physiology and biochemistry of the second professional examination for the degree of Bachelor of Veterinary Medicine and Surgery:—

Barabas, Arpad Zsigmond; Gardner, Ronald Ellis; Strachan, Euan Robertson; and Watkins, John Hubert.

Glasgow

Degree of B.V.M.S.

SECOND PROFESSIONAL EXAMINATION, DECEMBER, 1960

The following passes are announced in the subjects of veterinary histology, embryology and anatomy:—

Binaisa, Gabriel K.; Boyce, William K.; Boyd, John S.; Burhanuddin, Bin A. T.; Cockburn, Robert M. S.; Cowell, James L.; Davies, Wynne R.; Driver, John G.; Erhiacanoma, Erhire J.; Feldmar, Brian D.; Gibson, Michael W.; Glen, John B.; Halliday, Gordon J.; Houston, Johanne; Kitto, Hugh W.; Love, James A.; Macarthur, Alasdair W.; Macdonald, Mairi T.; Miller, Aleck M.; Nduaka, Ogbonnaya; Newman, Michael J. N.; Ramsey, John; Scott, James A.; Scott, John R.; Smith, Graham E.; Stewart, John M.; Tainsh, Campbell L. R.; and Wallace, James I.

SECOND PROFESSIONAL EXAMINATION, DECEMBER, 1960

The following passes are announced in the subjects of veterinary physiology and biochemistry:—

Binaisa, Gabriel K.; Boyce, William K.; Boyd, John S.; Burhanuddin, Bin A. T.; Cassar, Frank; Cockburn, Robert M. S.; Cowell, James L.; Davies, Wynne R.; Driver, John G.; Feldmar, Brian D.; Gibson, Michael W.; Glen, John B.; Halliday, Gordon J.; Houston, Johanne; Kitto, Hugh W.; Macarthur, Alasdair W.; Macdonald, Mairi T.; Miller, Aleck M.; Nduana, Ogbonnaya; Ramsey, John; Scott, James A.; Scott, John R.; Smith, Graham E.; Stewart, John M.; Tainsh, Campbell L. R.; and Wallace, James I.

FINAL PROFESSIONAL EXAMINATION, DECEMBER, 1960

Adshead, Philip; Akpata, Richard I.; Barclay, Donald F.; Calder, K. H.; Cowie, Alexander C.; Dalgleish, Margarita O.; Rickerby, Nancy V.; Veitch, Ernest R.; and Williams, Gwilym R.

PERSONAL

Births

COUTTS.—On December 29th, 1960, to Dorothy, wife of Kenneth Coutts, B.SC., M.R.C.V.S., of 22 Richmond Road, Corby, Northants, a second son.

GREENHAM.—On December 2nd, 1960, at Southmead Hospital, to Valerie, wife of Leighton Williams Greenham, B.V.SC., B.SC., M.R.C.V.S., of Highbridge, Bristol, a son, Simon Williams.

LESTER.—On December 26th, 1960, to Joyce, wife of W. Antony Lester, B.V.SC., M.R.C.V.S., 45 Lewis Lane, Cirencester, Gloucestershire, a daughter, Paula Alexandra, sister for Victoria.

TURNBULL.—On Christmas Day, 1960, to Dorothy, wife of Robert W. Turnbull, B.SC., B.V.M.S., M.R.C.V.S., a son, Graham Robert, brother for Jane and Claire.

COMING EVENTS

January

11th (Wed.). LINCOLNSHIRE AND DISTRICT DIVISION. Meeting at the Angel Hotel, Bourne, 2.15 p.m.

HERTS. AND BEDS. VETERINARY SOCIETY. Extraordinary General Meeting, at the Sun Hotel, Hitchin, 8 p.m.

ASSOCIATION OF VETERINARY FOOD HYGIENISTS. Meeting at the Golden Lion Hotel, Stirling, 2.30 p.m.

12th (Thurs.). B.S.A.V.A. SUSSEX REGION. Meeting at the New Imperial Hotel, First Avenue, Hove, 7.30 p.m.

20th, 21st and 22nd (Fri., Sat., and Sun.). Annual Conference of the Association of Veterinary Students in New Brighton, Wallasey.

26th (Thurs.). EASTERN COUNTIES VETERINARY SOCIETY. Special General Meeting in the Senior Common Room of the School of Veterinary Medicine, Madingley Road, Cambridge, 2.30 p.m.

February

7th (Tues.). 12th Anniversary Dinner-Dance of the University of Bristol Centaur Society at the Berkeley, Bristol.

9th (Thurs.). Annual Ball of the Royal (Dick) School of Veterinary Studies in the Assembly Rooms, George Street, Edinburgh, 9 p.m.

B.V.A. COMMITTEE & COUNCIL MEETINGS

Tuesday, January 17th, at 7, Mansfield Street

5 p.m. Finance Sub-committee.

Wednesday, January 18th, at 7, Mansfield Street

10.30 a.m. Farm Livestock Committee.
12 noon. Home Appointments Committee.
2.15 p.m. Small Animals Committee.
4 p.m. Parliamentary and Public Relations Committee.

Thursday, January 19th, at 7, Mansfield Street

10.30 a.m. Veterinary State Medicine Committee.
2.15 p.m. General Purposes and Finance Committee.

Friday, January 20th

10.15 a.m. Council Meeting, Connaught Rooms, Gt. Queen Street, London, W.C.2.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Ayr. Law Farm, Irvine (Dec. 23).
Ches. Brookside Farm, Macclesfield (Dec. 28).
Cornwall. Burnwhall Farm, St. Buryan, Penzance (Dec. 29).

Derby. Deepmoor Farm, Doveridge (Dec. 28).
Hants. Larkwhistle Farm, Micheldever, Winchester (Dec. 22).
Lanark. Beadwaters, Kirkmuirhill (Dec. 22).
Leics. Grants Farm, Church Langton, Market Harborough (Dec. 22).
Perth. Ballathie Farm, Stanley (Dec. 28).
Wilts. Orchard Farm, Netheravon, Salisbury (Dec. 29).
Yorks. Lodge Farm, Wighill, Tadcaster (Dec. 22).

Foot-and-Mouth Disease

Aberdeen. Middlethird, Mintlaw Station (Dec. 24); Old Meldrum, Aberdeen (Dec. 25); Brawlandknowes, Huntly (Dec. 28); Muirside Farm, Huntly; Meikle Newton, Leslie; Insch Field, Insch; Mill Hill Farm, Gartley, Huntly (Dec. 29); Cauld Lane, Keigh (Dec. 30); Auchlyne Clatt, Huntly (Jan. 1).
Banff. Midthird Farm, Drummuir, Keith (Dec. 22).
Ches. Dogkennel Farm, Shocklach, Malpas (Dec. 28).
Denbigh. Brook Farm, Worthenbury, Wrexham (Dec. 22); The Plough Farm; Kiln Farm; Whitehouse Farm, Worthenbury, Wrexham (Dec. 28); Dawsons Farm; Boundary House, Worthenbury, Wrexham (Dec. 29).
Dumfries. Applegarthtown, Lockerbie (Dec. 24); Halleaths Home Farm, Lockerbie (Dec. 31).
Kent. Bexley Hospital Farm, Dartford Heath, Bexley (Dec. 29).
Norfolk. Upper Buildings, Model Farm, Easton (Dec. 23); Church Farm, Earlham, Norwich (Dec. 27); Orchard Farm, Bunwell, Norwich; Milebridge Farm, Wymondham (Dec. 28); Costessey Park, Norwich; Bowthorpe Hall Farm, Costessey (Dec. 30); Lodge Farm, Costessey (Jan. 1).

Swine Fever

Cambs. March Road, Turves, Coates (Dec. 23).
Carmarthen. Gellylysged, Five Road, Llanelly (Dec. 22).
Ches. Elm Farm, Mollington, Chester (Dec. 22).
Durham. Downland Farm, Stillington, Stockton (Dec. 23); Hall Moor Farm, Staindrop Road, Darlington (Dec. 30).
Essex. Old Shield Farm, Burnt Heath, Ardleigh, Colchester (Dec. 29).
Lancs. Piggeries at Simpson Clough, Heywood (Dec. 26); 4 Mount View, Foulridge, Colne (Dec. 29).
Lincs. New Leake Fen, Stickney, Boston (Dec. 28); Howsham Grange, Howsham, Brigg (Dec. 30).
Middlesex. Brackenbury Poultry Farm, Breakspeare Road, S. Ickenham (Dec. 28).
Norfolk. Fern Bank, Carr Lane, Roughton (Dec. 26).
Suffolk. Denham Castle Farm, Denham, Bury St. Edmunds (Dec. 28).
Sussex. Hole Farm, Westfield (Dec. 26).
Worcs. 108 Longridge Road, Malvern (Dec. 29).
Yorks. Grange Farm, Little Brigham, Driffield; Elm Tree Farm, Keyingham, Hull (Dec. 26); Hagg Bush Farm, Burn, Selby (Dec. 29); New House Farm, Dalton Parva, Rotherham; Taira House, Church Street, Gargrave, Skipton (Dec. 30).

Fowl Pest

Bedford. Pickerings Allotments at Polhill, Goldington Road, Bedford; 40 Upper Shelton Road, Marston (Dec. 23).
Berks. Wyvols Court, Swallowfield, Reading (Dec. 24); Littlefield, Croft Road, Shinfield, Reading (Dec. 29); Radstock Farm, Early, Reading; 4 Ilbury Close, Shinfield, Reading (Dec. 30).
Bucks. The Hinge, Bow Brickhill, Bletchley (Dec. 26).
Dorset. Woodrow Cottage, Stourton Caundle, Sturminster Newton (Dec. 24); Haddon Lodge, Stalbridge, Sturminster, Newton (Dec. 26).
Essex. Burwains, Glebe Road, Ramsden Bellhouse, Billericay; New House Farm, Clacton Road, Mistley, Manningtree; Hillside, Brockhill, Wickford (Dec. 22); Maycroft, Church Road, Ramsden, Bellhouse, Billericay; Hillcrest, Crays Hill, Billericay; Does Hill Farm, Berwick Lane, Crays Hill; Clearview, Warley Hall Lane, Little Warley, Brentwood; Leigham Lane, Bicknacre, Chelmsford (Dec. 23); Overshot Farm, Moor Lane, Danbury, Chelmsford (Dec. 24); Basildon Cottage, Rectory Road, Basildon; Osea Island, New Maldon; Drapers Farm, Heybridge, Maldon; Mansion House Farm, Althorne (Dec. 25); Clatgates, Willingale, Ongar; Beulah, Glebe Road, Ramsden, Bellhouse; Egeria, Homestead Road, Ramsden Bellhouse (Dec. 26); Brooklyn, Timber Long Lane, Basildon.

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

GENERAL

"Promintic"—A New Anthelmintic for Sheep and Cattle

Sir,—The need for a new anthelmintic active especially against intestinal nematodes in ruminants is well recognised. The purpose of this communication is to give a brief description of a compound which appears to go far towards meeting it.

The remarkable anthelmintic activity of "Promintic"* 2-(β-methoxyethyl) pyridine against nematodes in mice has recently been described by Broome and Greenhalgh (1961). Similar results have been obtained in sheep and cattle. The compound, which is presented as a liquid formulation, possesses pronounced anthelmintic activity when administered subcutaneously or orally. At a given dose level the drug was found to be slightly more active against intestinal worms when given by the subcutaneous route.

Preliminary tests indicated 200 mg. per kg. as the optimum dose and it has now been used in extensive trials. Five hundred and thirteen sheep and 350 cattle, naturally infected, have been treated by the writer subcutaneously or orally, and the effect of treatment appraised by worm egg counts. Of these animals, 274 sheep and 96 cattle were examined *post mortem* 5 to 7 days after treatment and absolute worm counts made. The results showed that the treatment gave excellent results against the intestinal worms, especially *Trichostrongylus* spp., *Nematodirus* spp., *Cooperia* spp., *Ostertagia* spp. and *Trichuris* spp. In the abomasum, less excellent but still useful results were obtained. Immature and mature worms appeared to be equally susceptible to the compound. After treatment there was a marked clinical improvement. Full details of these experiments will be published later.

Yours faithfully,
J. K. WALLEY.

Imperial Chemical Industries Limited,
Pharmaceuticals Division,
Alderley Park,
Macclesfield,
Cheshire.
December 31st, 1960.

* "Promintic": Trade mark of I.C.I. Ltd.

Reference

BROOME, A. W. J., & GREENHALGH, N. (1961). *Nature.* **188.** Jan. 7 (correspondence).

Exchange of Students During Vacation

Sir,—May I make known to your readers that at the eighth annual congress of the I.V.S. Union, held in Copenhagen, the executive elected for 1960-61 was: President, M. A. Gordon (London); 1st Vice-President, P. Stoekel (Paris); 2nd Vice-President, E. P. Mount (London). Secretary, J. F. Staton (London).

One of the most important items discussed was student exchange for the purpose of seeing practice, and we in this country are hoping to play a more active part in this matter.

It is expected that representatives from 7 member countries will attend the A.V.S. Conference in Liverpool this January, and we hope that during the next summer vacation several British students will see practice abroad.

The congress next year will be held at Alfort (Paris) from July 26th.

Yours faithfully,
J. F. STATON.

Royal Veterinary College,
London, N.W.1.
December 21st, 1960.

B.B.C. Television : Foot-and-Mouth Disease

Sir,— Mr. Pittaway's letter (*Vet. Rec.*, December 17th, 1960) prompts me to repeat a question I think was asked on that television programme, namely, why may a farmer not have his own cattle vaccinated against foot-and-mouth disease voluntarily and at his own expense if he wishes?

I write this with humility being concerned only with small animals and having no first-hand experience of this disease or its prevention; but surely some start to replace, in part at least, the present slaughter policy with something a little less barbarous would be more fitting to our profession and civilisation? Would there really be any more danger than there is at present of unvaccinated neighbouring cattle contracting foot-and-mouth disease if a farmer decided to have his stock vaccinated under carefully controlled conditions with the best possible vaccine? I understand that the "carrier" state is extremely rare.

Yours faithfully,
W. E. M. PHILLIPS.

19 Mentmore Road,
Liverpool, 18.
December 21st, 1960.

A Tribute to the Animal Health Division

Sir,—I think I should be correct in saying that our profession does not always receive due recognition for its efforts in the common weal. It gives me much pleasure, therefore, to put on record the following facts. A farmer in the Nottingham area who lost all his stock recently through foot-and-mouth disease, was so impressed with the efficiency with which his outbreak was dealt with by the Ministry officials that he expressed a wish to give a donation to our Benevolent Fund as a mark of his appreciation. A cheque for £25 has been received with our grateful thanks, and I am sure the staff at the Mansfield foot-and-mouth disease centre, who dealt with the outbreak, will feel gratified that their skill and efficiency has been thus recognised. I feel also that the profession as a whole will be pleased.

Yours faithfully,
J. J. DUNLOP,
Hon. Secretary,
Victoria Veterinary Benevolent Fund.

College House,
29-31 Wrights Lane,
Kensington,
London, W.8.
December 31st, 1960.

Enteric Diseases of Calves : Infection by *E. coli* and Salmonella

Sir,—I have read this paper by Ingram and Lovell (*Vet. Rec.* **72.** 1,183) with much interest and agree with the conclusions expressed in the penultimate sentence; however, I am at a loss to discover how the host can be helped. I appreciate that any factor which reduces the resistance of the animal affects the host-parasite relationship in favour of the infecting organism; conversely, any nutrient offered which nourishes the potential pathogen more than the host will also lead to disease. One could continue indefinitely in this circular-type discussion.

I would pose more pertinent questions; (*a*) what evidence is there that lack of vitamin A, and (*b*) incorrect feeding, are sufficient to disturb the delicate balance between the new-born and *E. coli* in its alimentary tract?

To deal with *a*: I have analysed the livers of many new-born animals (calves and piglets) and have found them completely devoid of vitamin A. I believe it is generally accepted by workers in this field that the new-born receives its vitamin A from the colostrum and that none is laid down in pre-birth development.

To deal with the vitamin A of colostrum: I made a survey of an Ayrshire herd and found vitamin A values to lie between 20 and 400 I.U. vit. A per g. fat (the vitamin is fat soluble). Further, I have seen an Ayrshire cow successfully suckle 3 calves on an initial colostrum content of 20 I.U. vit. A per g. fat and from weight gain, health, freedom from scour or any other observable criteria there was no difference in these calves from one suckled on 400 I.U. vit. A per g. fat.

I carried this investigation to the extent of analysing colostrum from Hereford cows, on the supposition that this beef breed was nearer to natural rearing than cattle pushed for milk production, *i.e.* one calf per cow, the calf receiving the whole of the colostrum and milk. I found an average of 20 I.U. vit. A per g. fat—no more than the vitamin A content of average butter.

Dr. Wilkinson (private communication) from the analyses of livers of litter mates found, for rats, that there were no clinical or histological signs of vitamin A deficiency until after 11 days' complete depletion of vitamin A.

In any case, the function of vitamin A as an anti-infective vitamin is to prevent keratinisation of the mucous surface—a dry area making for the lodgement of microbes. Classical examples are xerophthalmia, the dry eye of humans; nutritional roup of poultry and the white nodules found in the throat of deficient poultry. In this paper there is no evidence of localised abscesses or necrotic foci of the membranes.

To deal with *b*: it is not clear if incorrect feeding means, in the case of pail fed calves, incorrect intervals of feeding—whether 2 or more times a day—or if is meant an incorrect balance of nutrients, *i.e.* a poor ration, or indeed, an incorrect choice of vitamin A supplement. I can make no comments on the first two, but for the last, one has to consider if the vitamin A offered is in the form of ester or alcohol. Certainly, liver storage is in the ester form but blood vitamin A is mainly in the alcohol form. The conversion of the ester, from store, to the alcohol, for use, may depend on an enzymic system which may not function properly for some days after birth. Hence, the feeding of vitamin A in esterified form to the new-born may be contra-indicated. As far as the new-born is concerned a race tends to develop between the promotion of efficient conversion (enzymic, catalytic, oxidation-reduction or what else) and bacterial toxaemia, for it is known that bacterial toxins may block off reserves of vitamin A in the Kuppfer cells of the liver.

I have found it quite impossible to couple *E. coli* infection with vitamin A status as far as turkeys are concerned. For some time I have been engaged in an investigation into egg peritonitis affecting flocks where artificial insemination is practised. I quote from a recent laboratory report: "There were extensive adhesions between the intestinal loop and between the bowel mass and the peritoneal wall of the abdomen; the ovary was fully active although very haemorrhagic. This bird was a typical case of internal laying. The organs of the birds have been extensively cultured but the only organism present consistently from most of the sites examined has been a strain of *E. coli*. Cultures from the yolk, in the abdominal cavities and in the bone marrow were almost pure in coli.

"The *E. coli* strains isolated from the previous specimens, and the strains present in the culture, you, yourself, isolated, have all proved untypable with any of the sera we have available here."

I would add that cultures have been submitted to an enterobacteriaceae laboratory and they have proved untypable there too.

This present investigation has ranged from attempting to isolate a virus by embryonic cultivation in both hen and turkey embryos; all attempts being completely negative. The P.P.L.O. aspect is being investigated but so far has offered no promise. The nutritional aspect is constantly under review both for intensive and extensive systems of management. I learn that the vibrio (venereal) aspect has proved negative. There is no question of resistant strains, for antibiotics have not been fed to the stock. There is no evidence of the passage of disease by normal contact, *i.e.* from pen mate to pen mate. Direct losses (deaths) about 5 per cent. indirect losses (internal layers sacrificed) about 10 per cent. Poults per hen from the whole flock 22. I know of one venture, now closed after losing £28,000 only making 6 poults per hen.

It is scant consolation to learn of *E. coli* infection. "The disease is largely due to a breakdown in a host-parasite relationship which would be an amicable one if not for the interference of man."

Man has, is, and always will interfere, and I would respectfully suggest *qui s'excuse, s'accuse.*

Yours faithfully,
T. BARTON MANN.

Braust,
Weyhill,
Nr. Andover,
Hants.
December 20th, 1960.

Diethylcarbamazine in the Treatment of Parasitic Bronchitis

Sir,—In the Parker and Vallely article in THE VETERINARY RECORD, Vol. 72, page 1,073, on the use of diethylcarbamazine in the treatment of parasitic bronchitis in cattle, the authors advised intramuscular injection, and suggested that the drug may be irritant given subcutaneously. Giving the larger quantities of this drug, which are necessary in large animals intramuscularly, obviously causes considerable pain, and can occasion difficulties in restraining the animals. I have always given this drug by intraperitoneal injection, and for the last 2 years have seen no untoward results which could be attributed to giving it by this route.

Yours faithfully,
OLAF SWARBRICK.

Surrey House,
Arundel,
Sussex.
December 20th, 1960.

How Not to Write to Colleagues

Sir,—What an extraordinary reaction Mr. Graham-Jones's letter has provoked in Mr. Bolton. The burden of his reply seems to be: "I write bad English and I am proud of it."

Am I right in diagnosing an inferiority complex? Or are we dealing with an advanced case of Chronic Inverted Snobbery?

From Mr. Graham-Jones we have an appeal for courtesy between members of our profession. Mr. Bolton apparently regards letters only as "basically a method for conveying facts from place to place."

I have a wide vocabulary of very basic English and a good shouting voice. Both can be useful for conveying facts but I would consider it bad manners (except in selected cases) to use either on my professional colleagues.

Yours faithfully,
J. A. CUNNINGHAM.

1, Market Square,
Leighton Buzzard,
Beds.
December 19th, 1960.